



# The Dock and Harbour Authority

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## Editorial Comments

### Barry Docks.

Though formerly merely a Welsh village and altogether unknown as a commercial centre before the closing years of last century, the Port of Barry, in Glamorganshire, closely contiguous to Cardiff, sprang into prominence about the year 1888, when it was combined with the neighbouring hamlet of Cadoxton to form a single community, which, by reason of its proximity to the South Wales coalfields, rapidly expanded into a notable town and seaport. In its development it owed much to the Barry Railway Company, under whose auspices, with the enlightened leadership of their chairman, Lord Windsor, the first dock was opened in 1889, enabling Welsh collieries in the Rhondda Valley to find an outlet for their produce to the sea.

Since that date, the dock accommodation has grown in extent and importance, as will be seen in the article in the current issue courteously supplied by the Great Western Railway. Of late years, especially during the war, the exports of coal from the locality have been considerable, but, unfortunately, the aftermath of peace has resulted in a heavy reduction of tonnage. In this respect, Barry has suffered in common with its neighbours, forming the entire group of ports along the Glamorgan and Monmouthshire coasts. Attempts are being made not only to resuscitate the coaling industry in the area, but also to exploit the possibilities of general trade, and Government assistance has been invoked to influence the transit of manufactured goods from the Midlands to the Bristol Channel.

It is thought that this object may be assisted by the increase of facilities for road transport and the Minister of Transport has stated that he has the matter under consideration. But account must be taken of the conflict of interest with the ports on the Eastern Coast of England, which suffered severely during the blitz period from the diversion of their normal shipping traffic. If it can be done without detriment to Eastern ports, everyone would rejoice to see the Welsh ports regain their former prosperity, so that they may make their contribution to the volume of overseas trade, which is so necessary to the national well-being.

### The Tyne Tunnel Bill.

There has been some keen conflict of opinion on Tyneside respecting the scope of a project which has been under considera-

tion for some time and is now the subject of a Bill before Parliament promoted by the Northumberland and Durham County Councils, for powers to construct three tunnels under the River Tyne between Jarrow and Wallsend, about 3 miles above the harbour entrance—one for vehicular traffic and two for pedestrian and cyclist traffic. The tunnels are designed with crowns at a depth of 44-ft. below low water of ordinary spring tides; but there is a deviation allowance upwards of 10-ft.—and this is the crux of the matter, for if it were taken advantage of to the full extent, the tunnel crowns would only be 34-ft. below low water level. Allowing 10-ft. of cover for safety, the available dredging depth in the navigable channel would not exceed 24-ft., which is actually less than the depth at present provided over the proposed site. Such a restriction would prejudicially affect the accessibility and development of the important shipbuilding and ship-repairing yards at Hebburn, Wallsend and Walker, as well as the quays at Newcastle and Gateshead which lie inland of the proposed tunnel line.

The Tyne Commissioners, with every justification, are pressing for a revision of the crown level such that the channel could be dredged to a depth of 50-ft. below low water level, ordinary spring tides, without responsibility for damage.

The same problem has been experienced in other rivers—notably in the Thames, in connection with the construction of the Dartford Tunnel, now in hand though delayed by the war, where an allowance of 50-ft. below the bed of the river has been secured through the representations of the Port of London Authority. The ruling factor is the continued increase in shipping draught, combined, of course, with the consideration that every additional foot in depth adds disproportionately to the cost of the tunnel. Yet whatever be the cost, it would be a fatal mistake to restrict or impede the accessibility of a port to shipping.

### Manchester Ship Canal Prospects

The 88th Ordinary General Meeting of the Manchester Ship Canal Company, on February 28th, gave the Chairman, Sir Frederick J. West, K.B.E., an opportunity of describing the war-time record of the Company, which was highly creditable, despite the damage sustained in air raids, during which No. 1 grain elevator was lost, besides a good deal of warehouse accommodation, and also of referring to the future prospects of the Canal undertaking.

*Editorial Comments—continued*

Financially, the Company during the past year has suffered a rather serious reverse. Due to restrictions and controls on its main pre-war imports of timber, petrol, cotton, grain and newsprint, there has been a pronounced reduction of incoming traffic. "Although during the war," said Sir Frederick, "the Port of Manchester had topped the monthly returns in tonnage for the whole country, the toll-earning tonnage in 1945 was lower than in any year since 1938 and the receipts from ship dues the lowest since 1923."

Despite the depressing effect of such an announcement, Sir Frederick expressed himself optimistically about the future. Import traffic may confidently be expected to improve from its present volume, and the Company is modernising and enlarging its plant for handling various types of goods. It is also taking steps to facilitate further local industrial development as a stimulus to inward and outward traffic.

To achieve this result, there must be a great development of export trade and this is a desideratum, not only for Manchester and South Lancashire, but for the whole of the country.

**The New York Free Port Zone**

The Free Port Zone at Staten Island, New York was referred to in a Comment in the February issue as the only survivor of several such zones projected at United States ports under the provisions of the Celler Foreign Trade Zones Act passed in 1934. The New York zone was established in 1937, and in the following year, the City of New York organised a private corporation, called the New York Foreign Trade Zone Operators, to run the concern. Apparently, it has achieved a reasonable degree of success, especially in promoting trade with Latin-America, and it is now announced in the New York *Herald-Tribune* that U.S. Congress is debating additional provisions to the Act to broaden the zone's privileges.

At present goods can be brought into the zone and "manipulated," that is, stored, broken up, repacked, sorted, cleaned and mixed; in effect, everything short of manufacturing. But manufacturing is what importers want to do. An example of manufacturing would be the importation of essential oils and spirits, which, by means of processing plants installed in the zone, could be manufactured into liqueurs, tonics and other products for export at enhanced prices. It is also desired to hold International Trade Fairs in the zone.

As already stated, there are at present no Free Port Zones in Great Britain, the functions of such areas being met by the provision of Bonded Warehouses, in which the processes covered by the term "manipulation" can be carried on under Customs supervision, the goods remaining temporarily free from duty.

The extension of manufacturing facilities to the Staten Island Zone is an interesting exploitation of the Free Port idea and the experiment may be attended by further developments.

**Floating Stage Berthage**

An extraordinary potential application of floatable decking to the uses of port operation is illustrated in this month's issue in the article by Mr. A. M. Hamilton describing his twin inventions of "Lily" and "Swiss Roll," which were used so effectively in the later stages of the war, mainly for the service of aircraft, but also as a means of supporting afloat lorries and other vehicles in a laden condition.

The Swiss Roll, with its fundamental basis of surface tension, is certainly a novel idea, but pontoons have long been in use as a means of supporting roadway traffic across streams and along river banks. Perhaps the most notable example is the long, flexible water-borne approach, 550 feet in length by 35 feet wide, leading to the Liverpool Landing Stage, by means of which an easy incline for goods traffic is provided at all states of the tide. The Landing Stage itself is also a floating structure, supported on iron pontoons, 2,534 feet long and 80 feet wide, connected to the shore wall by 10 hinged bridges. The Mersey Estuary is tidal, and during springs there is a range of level up to 30 feet.

The Tilbury Landing Stage, at the mouth of the River Thames, is another example. It has a length of 1,142 feet and a width of 80 feet, and is secured to the river bank by four hinged steel

booms and heavy mooring cables. The stage rises and falls with the tide through a range of as much as 20 feet.

A still more notable invention, which apparently has not so far passed the experimental stage, is that of an ice-made deck for aircraft carriers, which is essentially a floating platform of "Pykecrete" blocks. "Pykecrete," which is stated to be about 86 per cent. ice and 14 per cent. wood pulp, is a mixture of mechanical pulp and water in the form of a "mush," spread on a flat surface and rolled into a uniform smooth layer,  $\frac{3}{4}$ -in. thick. This is then frozen by blowing cold air over it. The "Pykecrete" is protected from melting and erosion by an insulating skin, tough enough to withstand normal weather conditions and any battering it is likely to receive from the sea.

Such, at any rate, is the description of "Habbakuk" (the name given to the contrivance, from the Hebrew prophetic book), as recorded in the press. Though devised in September, 1942, by Mr. Geoffrey Pyke, then acting as Director of Programmes at Combined Operations Headquarters, and submitted, it is stated, to Mr. Winston Churchill and Lord Cherwell, the project of forming a floating airfield in this way had ultimately to be abandoned owing to economic difficulties and the progress of the war. But it remains a potential portent of great interest, even if there be some ground for scepticism about its practicability.

**The Severn Barrage.**

Has the Severn Barrage Scheme been shelved? The question arises quite naturally from the evasive and inconclusive reply made by the Minister of Fuel and Power to a question put recently in the House of Commons. The recommendation of the Panel of Engineers appointed in November, 1933, to review the conclusions of the Barrage Committee of that year, was that, if it should be decided to proceed with the scheme, it would be desirable to construct a new tidal model and to give the Dock Authorities concerned the opportunity of being represented on a committee of hydraulic experts to supervise its construction and operation.

Mr. Shinwell, replying to Sir Stanley Reed on February 12th, said the matter was still "under review" and that he "was not yet in a position to make a statement." Having regard to the length of time which has elapsed since the Panel of Engineers made their report (published in our issue of April, 1945), it rather looks as if the Government, with their hands full of other matters, were reluctant to proceed with the proposal. We imagine that port officials at Bristol and Avonmouth would regard the dropping of the scheme with equanimity, if not with definite relief.

**A "Parliament of the Ports."**

With this arresting title, Mr. J. H. Hannay Thompson, of Granton Harbour, Edinburgh, puts forward in his article in this issue a proposal for dealing with the complicated question of future British port administration by means of a central representative body of a "semi-independent" character, within the nationalised scheme of control, the introduction of which the nation has been warned by the Government to expect very shortly. While welcoming the suggestion as a subject for consideration, it seems to us a somewhat thin disguise for the hidden hand of bureaucratic direction from Whitehall, which we have unhesitatingly condemned in past issues. Furthermore, we suggest that a Parliament of Ports is already in effective existence in The Dock and Harbour Authorities' Association.

**EDITORIAL CHANGE****Vale.**

With this issue, the last of the present volume, Dr. Brysson Cunningham retires from the editorship of the Journal, a position which he has occupied for a little over fifteen years. He desires to express his grateful acknowledgments for the kind and unvarying support he has received from the publishers and from his readers in all parts of the world. He is succeeded in the editorship by Mr. K. R. Doggett, who has assisted him for a number of years past, and who will use every endeavour to maintain the high standard of technical journalism which has been the object in view throughout the Journal's existence.

In future, all editorial communications should be addressed to 19, Harcourt Street, London, W.1.



Aerial View of Barry Docks

## Barry Docks

### *An Enterprising South Wales Undertaking*

(CONTRIBUTED)

#### Early History

**T**HE early history of Barry Docks is not without interest and a fleeting glance at the records of what took place in the early days of the port will, it is felt, help the reader to appreciate the enterprise and businesslike acumen of the old pioneers, because to these men the present generation owe a great deal for the foresight and courage shown in the face of severe opposition.

The Coal Freighters of Cardiff and district had for many years been agitating for increased dock accommodation at Cardiff to meet the heavy demands of the coal trade, which for years had been continually expanding.

In 1882, the trade of Cardiff was far in excess of the dock facilities, and from records it is learned that due to the serious block and congestion of trade it was possible to walk from one side of the dock to another on the decks of vessels moored alongside one another. How trade was to be carried on during the following years was to many a problem of deep concern.

The proposal to build a new dock and railway was first mooted at a meeting held in Cardiff by the Local Freighters on the 23rd June, 1882, where it was decided to appoint an engineer of repute who should furnish a preliminary report upon the most suitable site for a new dock. After lengthy negotiations, the site favoured was that at Barry. The requisite promotion money was soon

forthcoming and on 30th November, 1882, the Parliamentary plans and details of the proposed undertaking were deposited.

The first Bill was promoted in 1883 and passed the House of Commons Committee on 11th May, 1883, but the House of Lords Committee, on 26th July, 1883, threw out the Bill. It was not until July 31st, 1884, that the second Bill went through Parliament. The cost of the contest over these Bills during 1883-1884 Sessions amounted to £160,000.

The first sod of the New Dock was cut by the Right Hon. The Lord Windsor, Chairman of the new Company, on the 14th November, 1884, at a point near where the present general offices stand.

The Barry Dock and Entrance were formed on the Eastern part of the estuary which separated Barry Island from the mainland, the Western part of this estuary being retained as a harbour of refuge for small craft.

With the construction of the dock, work was proceeding apace with the building of the railway, and on 22nd November, 1885, the first engine belonging to the Barry Dock and Railway Company travelled over the line from Pontypridd to Barry.

July 18th, 1889, saw the culmination of this great commercial enterprise, the Barry Dock and Railway on that day being formally inaugurated in their career of utility to the South Wales' coal trade.



### *Barry Docks—continued*

The trade of the port increased to such an extent that an additional dock was found necessary, and it is interesting to note in this connection that this was the only occasion upon which a Bill promoted by the Barry Company was unopposed in Parliament.

No. 2 Dock, Barry, was commenced in 1894 and opened to traffic in October, 1898.

It is not generally known to-day that the late Barry Company, in addition to being a dock and railway owning Company, were owners of a fleet of pleasure steamers, which ran between Barry Pier and ports and places on the South side of the Bristol Channel, and four up-to-date steamers were put on the service. The Passenger Steamers Service, however, was never a success, and in 1910 the Company disposed of the vessels to a syndicate.

#### **Amalgamation with Great Western Railway**

With the passing of the Railways Act of 1921, which divided the railways of the country into four main groups, the Barry Railway became amalgamated with the Western group, the principal Company in this group being the Great Western Railway.

Since the Barry Docks became Great Western property, the same progressive policy of keeping the port abreast of the times has been maintained. At this juncture a few brief particulars of the present dock accommodation and facilities might not be out of place.

#### **Dock Accommodation and Facilities**

There are three docks, Nos. 1, 2 and 3, having a total deep water area of 114 acres—served from the Bristol Channel by the Lady Windsor Deep Water Lock and the Basin Entrance. The former lock is 650 feet long by 65 feet wide. It has three pairs of lock gates and is divisible into two locks, each capable of accommo-

dating a large vessel. The approach is provided with guiding jetties which give easy access to the lock. The Lady Windsor Lock is of exceptional depth, which enables locking operations to be carried on over a wide range of tide, thus allowing vessels to enter and leave with the greatest facility and a minimum loss of time. The basin entrance, which is the alternative entrance to the deep sea lock, is 80 feet wide, and this lock also serves as an entrance to Nos. 1 and 2 Docks.

There is 25,840 feet of quayage in these two docks, equipped on the coaling side with 30 modern coal hoists, the majority of which are capable of dealing with 20-ton wagons. To avoid as far as possible the breakage of large coal when being shipped, special anti-breakage appliances of the escalator type are provided, and for certain other classes of coals, such as washed Duff coals, which do not run freely, special mechanical appliances for digging this type of coal out of the wagons are used to facilitate shipment.

On the general cargo side there are 50 up-to-date quayside cranes with lifts of varying capacity up to 50 tons. Heavy lifts which cannot be dealt with by the ordinary quayside cranes are accommodated by means of floating cranes of 50 and 100 tons capacities.

Transit sheds with a total covered floor space of 348,304 square feet have been provided adjacent to the quays, and general merchandise can be dealt with direct to or from warehouse, rail or road vehicle simultaneously.

#### **Trade of the Docks**

Barry Docks are world famed as a coal exporting port and over eleven million tons of coal have been shipped in a single year. Being so well known for its activities in this direction, the fact that these docks also carry on quite an appreciable general cargo



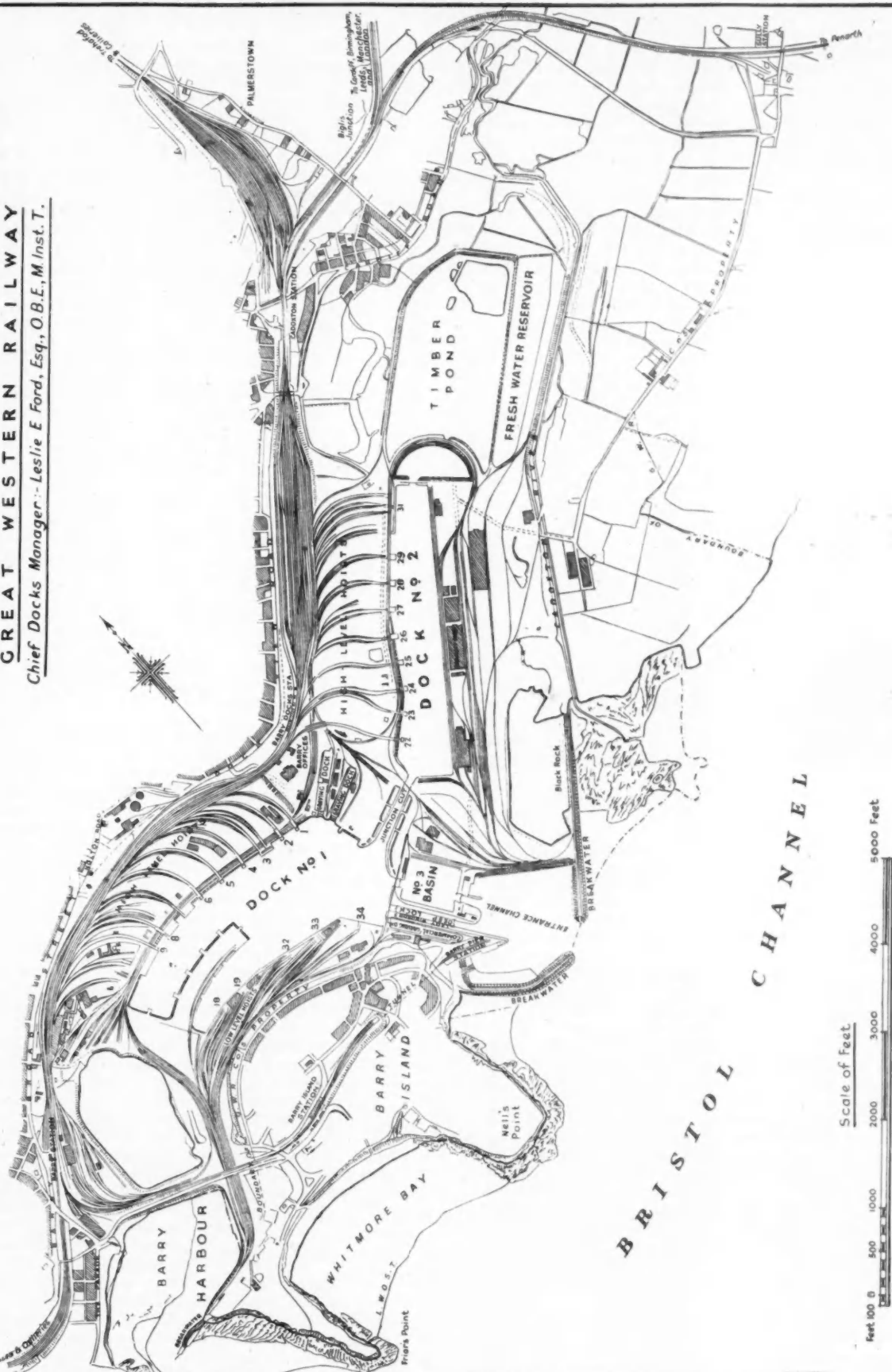
Five New 20-ton Coal Hoists at No. 1 Dock, Barry



# BARRY DOCKS — GLAMORGAN, SOUTH WALES.

## GREAT WESTERN RAILWAY

Chief Docks Manager:— *Leslie E Ford, Esq., O.B.E., M Inst.T.*

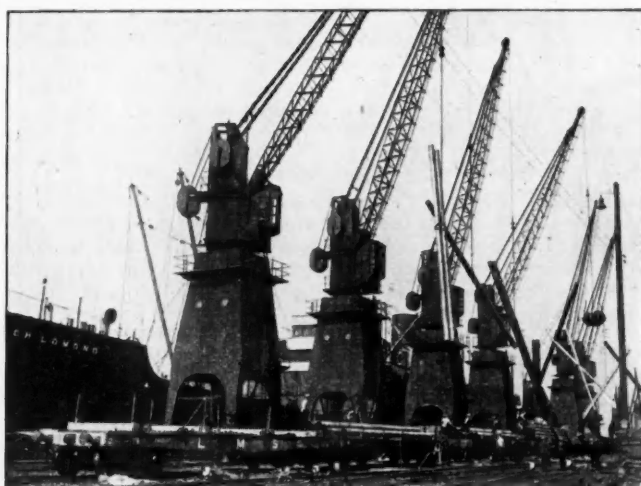


### Barry Docks—continued

trade is sometimes apt to be overlooked. Their equipment for general cargo, however, proved of immense value to the country during the war when Barry Docks undertook a large share of the war effort and became an important centre in the country's vital lines of communication, handling large quantities of materials, armaments, stores and equipment for the armies at the various fronts, as well as foodstuffs, etc., required to feed the nation at home.

On the South side of No. 2 Dock, Messrs. Joseph Rank, Ltd., have erected large, up-to-date flour mills. The firm's discharging and loading berth is equipped with elevators and conveyors for discharging cargoes direct to the firm's silos, etc., as well as loading overside, over 200,000 tons of grain being dealt with in 1938, the last complete year prior to the war.

On the South side of No. 2 Dock also there is a cold store, alongside which ships may be moored. These stores have accommodation extending to 194,000 cubic feet and can be extended to meet increased demands.



S.S. "Loch Lomond" Discharging General Cargo

Sawn timber is another important item in the normal trade of Barry Docks. Messrs. Meggitt & Jones, Ltd., have their saw mills and works adjacent to the Basin Quay, where vessels discharge their cargoes of deals, battens, boards, etc.

Consequent upon the close proximity of Barry Docks to the coalfield, a large trade in pit-wood and mining timber is conducted, in pre-war years some 150,000 tons passing through the docks annually.

Other general traffics embrace cement, oil, building sand, tin-plates, steel and galvanised sheets, tubes, bauxite ore, gypsum, etc., which are regularly dealt with.

#### Barry Graving Docks

No dock system is complete without dry docks and in this connection Barry is particularly well equipped, there being three dry docks at the port. The Great Western Railway Company are the owners of the Commercial Dry Dock, which is 860 feet by 60 feet, being divided into two compartments of 493 feet and 366 feet respectively, each compartment representing two berths. The Barry Graving Dock Company are the owners of two dry docks, one 620 feet long by 70 feet wide and the other 790 feet long and 60 feet wide, the latter being divided into two compartments of 350 feet and 403 feet, each compartment making two berths.

#### War-Time Extensions

The heavy war-time demands upon the port's facilities called for the introduction of many new works, and additions to the existing facilities and equipment.

Siding accommodation was increased for the storage and marshalling of railway wagons; quay areas built up to rail level to

allow ready access to ship's side for road motor vehicles; more cranes; additional transit shed accommodation; electric and petrol driven warehouse trucks and mobile cranes, and a quantity of miscellaneous gear of all descriptions were provided, and appreciably enhanced the port's capacity for the handling of general cargoes of all descriptions.

Now that the war is over, Barry Docks are settling down to a programme of activity designed to recapture their share of the country's peace-time shipping trade, and will be assisted in this objective by the plans which the Great Western Railway Company have in hand for the post-war development of this important South Wales dock system.

### The Port of Sunderland

#### Annual Report of the River Wear Commissioners

The annual meeting of the River Wear Commissioners was held at Sunderland on 20th March last, and in the course of his address, Sir Frank Nicholson said that last year a new record in exports for the Port of Sunderland was achieved with a total of 272,000 tons, nearly all military supplies. The total was reached because long after the war in Europe ended the port continued to ship cargo after cargo to sustain the British Army of the Rhine. Imports were down from 118,000 tons to 79,000 tons, but only because, general cargo facilities being limited, the port could not accommodate import and export trades simultaneously.

The coal trade increased nearly 2 per cent., from 2,109,000 tons in 1944 to 2,143,000 tons in 1945. In pre-war days normal coal export was from four to five million tons yearly. This business was the foundation of Sunderland's trade, and the main source of revenue.

The financial result of last year's working was a net surplus of £10,500, to be handed over in further reduction of unsecured debt to Sunderland Corporation, bringing indebtedness down to £76,000. The Corporation quay gross revenue exceeded £125,000, and a total of 165,000 tons of traffic was handled. The result would be that the new quay, with its heavy loan charges, should be no charge on the rates this year.

Of the future he said, "Three questions are in the minds of us all—improvement of the port and harbour, development of our trade and the nationalisation of docks and harbours." As to improvement schemes, they were walking step by step with Sunderland Corporation. By continuing to work closely together they would secure for Sunderland development and progress which could come no other way. The Minister of War Transport, in asking for a three year programme of capital expenditure, asked them to be realistic. They intended to take the Minister at his word. They were beyond the paper stage. If there was any hold-up it would not be the fault of the Commissioners. They could not go on without sanctions from the Treasury, and these they were now awaiting. They were taking every useful step towards recovery of their peace-time traffic and the development of new business. With the future of the coal trade doubtful their chief hope lay in general cargo. Many controls still existed, and many restrictions, but everything possible would be done.

If there was to be nationalisation of ports, and rumours about it were very strong, they in Sunderland must make it very clear that while they would work under any new system set up by proper authority, due regard must be paid to their considerable potentialities, their responsibility to the local community and the position of world importance that had been won for Sunderland.

#### South African Harbour Management

In succession to Brigadier C. M. Hoffe, Mr. William Marshall Clark, O.B.E., B.Sc., A.M.I.C.E., has been appointed general manager of the South African Railways and Harbours. He is 46 years of age and had previously occupied the position of controller of ship repairs with headquarters at Cape Town.

## Port Administration

### Aspects of Nationalisation

By J. H. HANNAY-THOMPSON  
Ph.D., B.Sc., B.Com., M.Inst.C.E., M.Inst.T.\*

The advent of a Labour Government at Westminster has given a fresh urgency to the question of the unification of Port ownership and control on a national basis. No longer is it purely an academic question of "if," but it may soon become the urgent and practical one of "how," or for those most vitally concerned, "how best." The Government as yet has given no indication of how it proposes to deal with the problem to which it is committed, though the schemes for the nationalisation of the Bank of England and the coal mines may give a hint as to what is in prospect. The problem of the docks, however, is rather different from either of these. The Bank was a convenient unit, already largely under Governmental control, while the mines were many and diverse and completely in the hands of private enterprise. The Ports, on the other hand, with the exception of those which are owned by the Railway Companies and a few private Companies, are already in public, though not national ownership, and the foundation upon which the national structure will have to be built is very different.

Many important maritime countries already have nationalised systems of Port Administration, and in addition to the obvious advantages which are gained through unification of control, many unexpected and important, though less obvious disadvantages have been discovered. As they are disadvantages which have been experienced in practice and are not mere debating points, any scheme of nationalisation must be designed to avoid the unfortunate experiences of others. These disadvantages arise primarily not through weaknesses of the system as laid down in the first place, but through the weaknesses of human nature and the absence of adequate safeguards to protect the interests of those who use the Ports.

#### The French System of Administration

France is the most important maritime country which has a system of State-administered harbours. Though the Ports of Le Havre and Bordeaux enjoyed a considerable measure of local autonomy during the period between the two wars, they lost their independence a few months before the outbreak of the second World War. In considering the system of administration in France, the important part which management by the Central Government plays in all sections of French affairs must be borne in mind. In France the power of the local authorities is extremely limited and most of the functions which are carried out by local authorities in Great Britain are, in France, exercised by the State, owing to the relatively weak financial power which can be delegated to local bodies under French Law. The principle which has been made the basis of the administrative régime of the French ports was laid down at the time of the French Revolution, and all ports are controlled directly by administration by State Department on the military system, in common with all roads, highways, bridges and allied public works. Though most of the French railways have been in national ownership for a long time, they come under the régime of a different Department, for the French ports are run by the Department of "Ponts et Chaussées" (Bridges and Highways).

The system of administration is more closely allied to that of our Naval dockyards than any other. The State supervises the construction, maintenance and working of all quay and foundation works and the carrying out of dredging, removal of wrecks, soundings, etc., and it is also responsible for the allocation and collection of dues, etc., on steamers and goods, and draws up all regulations of a general nature. There is nothing which bears the least resemblance to our Port Trusts or Commissions, though the regional Chambers of Commerce have much wider powers than our Chambers of Commerce and usually are responsible directly for the working, maintenance and management of cargo-

handling appliances. They can, however, only express opinions of tender advice on matters concerning general programmes where capital expenditure is involved or dues have to be collected. In some cases, concessions are given to independent firms for working part of a port. The expenses of harbour construction and maintenance form part of the National Budget. The result is that there are no individual accounts for the total cost of construction of any special port, and no account of the sums invested by the State in their construction has ever been made. In spite of this uniformity of accounting method, there is no uniformity of charges, such as exists in the British railway rates classification. The problems of the individual ports have been found to be too varied to admit of it, even if it were considered desirable.

All the services which come under the Ministry of Public Works in a port are placed under the authority of the Port Director, who is responsible to the Minister, and being appointed by decree, much of the authority normally exercised by the Ministry is delegated to him. The Port Director is thus the principal voice of the Government in his particular sphere. He is assisted in his duties by a consultative committee, which is appointed to look after the local interests of the users of the port. The Director keeps in contact with this and the Chamber of Commerce, but though he must consult with them on all matters concerning the port, he is under no obligation to accept their advice. The members of this committee are appointed by decree by the Minister of Public Works or his representative, and are chosen from lists of possible candidates which are provided by the Chambers of Commerce and similar bodies.

The Chambers of Commerce in France have always had the duty of carrying out certain works and administering certain services which are entrusted to them, amongst them being the control of the management and the services of the public plant in the ports. However, in turn they entrust the routine management to the Port Director, so that he thus controls the whole port, though theoretically he is responsible to one Ministry from the constructional and administrative side, and to another from the operative and managerial side.

Provided the Port Directors are men of outstanding ability and complete integrity, this rather strange system of dual control appears to have worked very well in the past, but where the representatives of the Government are lacking in initiative or foresight or a high sense of public duty, the results leave much to be desired.

The principal disadvantages of the system, however, have not revealed themselves at individual port level, but rather in the troubles which arise from over-centralisation. As in all French organisations, the Central Government has always maintained a very strong grip over Port Administration, because of the necessity of controlling finances which form an integral part of the National Budget. The ultimate responsibility for all policy rests in the hands of Government servants, and when the approval of the Ministry of Finance has been given, the works are authorised by decree. As the members of the consultative committee can only advise the Port Director, if they are at variance with him, their only recourse is to go behind his back to a higher authority, and lobbying and underground pressure are rife.

The chief criticism levied against the system is its lack of flexibility and the absence of close contact between the officials and the commercial interests, who are only able to advise and persuade, without having the power of active decision in matters of major importance. As port expenditure forms a part of the National Budget in the same way as the fighting and other services, it is entirely dependent upon the views of the Government of the day. Port policy is therefore subject to political influences and the exigencies of national finance, and a complaint frequently made was that after the requirements for the defence and ordinary services had been met by the Government, little money was left for port development. A change of Government often entailed a change of policy, and cases of the curtailment or cessation of important harbour works, even after they have been authorised, were not unknown, and the shadow of uncertainty hung over the whole system.

It was often found that the grip of the Central Government upon their local officials was unduly strong. These officials were forced to submit many matters to their superior officers in the Government service, which in British trust owned ports would have been

\* General Manager, Granton Harbour, Ltd.



### Port Administration—continued

settled on the spot. The reviewing of such questions placed upon the officials of the Central Government a larger amount of work than they were able to get through, and it was quite common for delays up to as much as three years to be experienced in obtaining sanction for quite simple proposals which encountered no opposition. The more extensive the works, the greater the delay, especially if through their financial implications, they had to be reviewed by some very high State official who could only devote a limited portion of his time to harbour affairs, to the affairs of the harbours concerned.

#### National Control in other Countries

Many other countries, including some British Dominions, notably Canada, South Africa and Australia, had schemes which are substantially similar to the French pattern, though differing in detail. Here again criticisms are generally the same as those found in France, though in addition it is frequently alleged that port development for party politics or vote-catching has occurred. Complaints have been made that it is sometimes difficult for a port whose local representative is not a member of the Government, to get things done, while cases of the construction of extravagant facilities in excess of the requirements of the trade give rise to a fear that their promotion has been fostered for political rather than for economic ends.

It is also generally found throughout nationalised systems that the smaller Ports suffer to the benefit of the larger, particularly where there is overlapping of the areas which they serve.

#### Flexibility Essential

When devising its schemes, it will be necessary for the Government to bear in mind one essential fact which distinguishes ports from all other forms of enterprise, *i.e.*, the extremely casual nature and uncertainty of their trade, particularly when the very high cost and permanent nature of the engineering works involved is taken into consideration. Thus there is a guaranteed and fairly steady demand for the products of coal mines, hydro-electric schemes, etc., with at least a sure minimum return on the capital involved. Seaborne trade, on the other hand, is subject to the most violent fluctuations, and even an apparently well-established trade may be cut off without warning, owing to changes in the policy of some overseas country. For this reason if for no other, the system of Port Administration will require to have a large measure of flexibility, with ability to take rapid decisions, at the same time giving continuity of purpose.

#### Basic Principles

The study of the various systems of administration which are in existence throughout the world shows that there are certain principles which must be the basis of all Port Administration. The administration should lie in the hands of some form of public or national organisation, whose interests and decisions should be completely impartial. Not only must it show impartiality with regard to the sectional trade or business interests, but it must also be independent of political pressure or party influence.

The general constitution of the controlling bodies in the individual ports should be upon similar lines to that of the central or controlling body, and further, it would appear that this similarity should extend from port to port, and that the present system whereby ports are administered from differing basic principles should be discontinued with the possible exception of the small privately-owned harbours, which in most cases form part of large industrial organisations. It is possible that it would be more efficient to deal with these by means of concessions on the French principle, and thus bring them into the whole scheme with the minimum of interference.

The central authority should have powers to prevent uneconomic competition, but the local bodies should have the maximum amount of freedom, subject to this. Each port must have sufficient financial resources at its command to enable it to pay for all working and maintenance, and conjointly, they must also contribute sufficient to finance the cost of all capital construction and subsequent addition, if State subsidy is to be obviated.

The administrative authority must be in a position to make decisions quickly, to keep in close touch with trade and its re-

quirements, while at the same time it must be a responsible body. Those who direct the administration must have a highly specialised knowledge to enable them to solve the intricate technical and financial problems which Port Administration presents, such as can only be obtained through a period of training, or, uninfluenced by selfish motives, they must be in a position to pass a reasoned judgment upon such alternative propositions as may be placed before them by experts in the various fields covered by Port Administration.

#### Financial Control

As has already been stated, it is axiomatic that under any system of nationalisation there must be some form of central controlling body. Not only must it be in a position to adjudicate between the claims of competing ports for a traffic—for it has been the experience of the existing systems of nationalisation that unless individual ports are restrained by the central authority, they compete with each other for traffic just as actively as if they were independent—but the central body must also have a substantial if not complete measure of control over the finances of all ports.

It is obvious that the central body must take over all the Government functions which are at present carried out by Parliament, but it appears that the first major decision which will have to be taken is as to whether this body shall be considered the representative of the Government which will actively direct port activities, or whether in practice it will be the representative of the ports which will advise the Government and endeavour to carry out the policies laid down by the Government.

#### Parliament of Ports

In view of the results experienced overseas, it appears that much would be gained by the adoption of the second alternative, *i.e.*, the creation of a semi-independent body which might be described as the "Parliament of the Ports," which would be responsible for laying down the main principles of administration. Such a body would naturally relieve the Ministry of Transport of much responsibility and routine work. It would be an irresponsible body, but would provide a buffer which would protect the ports from the results of party political control in its more sinister aspects.

Following our normal democratic tradition, it would be better for such a body to be composed of the elected representatives of the interests it was appointed to serve, rather than a military nationalistic system of persons appointed by the Government of the day to execute their policies. The Central Body should be constituted much on the lines of the existing Port Trusts, with a balanced representation of those interests which are directly concerned in Port Administration, *i.e.*, representatives of shipping, Chambers of Commerce, payers of dues, organised labour and the like, each category electing or appointing its own representative. It is interesting to note, in passing, that where representatives of such categories are elected at present to represent the varying interests upon the local Trusts or Commissions, it is very rare for the election to be contested, and in point of fact, new members usually owe their position to co-option or nomination, rather than to election in the strict sense. Once elected, a member is in practice re-elected almost as often as he wishes. He is, however, put forward by those whom he represents, in contra-distinction to the system in France where the corresponding representative is selected by the Government from a list of approved candidates.

The Central Body should contain a larger measure of port technical or professional representation than the present Trusts. It would be better for it to be so constituted that the experts in Port Administration have a voice in its deliberations, rather than that they should be called in in a consultative capacity only, as is the case in the existing Port Trusts. The number of members need not be large. Probably about 25 would give adequate representation to the differing trade and regional interests involved, and in view of the large number of conflicting claims between ports which would have to be settled in the initial stages, there is much to be said for the suggestion that the position of Chairman be filled by someone who is primarily accustomed to acting in a judicial position, leaving the administrative power in the

### Port Administration—continued

hands of a Vice-Chairman whose duty it would be to arrange the details in accordance with the decisions of the body as a whole.

#### Port Trust Constitutions

It does not appear that there is any necessity to interfere greatly with the constitution of the existing Port Trusts. These bodies already administer the resources of the Ports in the public interest and the transference of their responsibility to the national interest would not involve drastic changes. These bodies are possessed of great resources of specialised knowledge and business initiative which should not be lightly set aside. The numbers of representatives on certain of the larger Boards might be considerably curtailed with advantage, but in this the records of attendance of the constituent members would provide a valuable guide.

In looking to the future, the system which would best avoid the difficulties and dangers experienced elsewhere would seem to be one founded primarily on the present form of administration which is peculiarly adapted to our national characteristics, and which has proved its value from the local standpoint for over a hundred years. One feels the most efficient solution will lie in a further development of the principle of a Trust on an elected basis, though nation-wide in scope, rather than in a system of administration by persons directly appointed by the Government to form a "chosen instrument" to carry out the policy of the Government of the day.

## Emergency Floating Dock Construction

### War-time Expedients with Reinforced Concrete

A Paper, entitled "Emergency Construction as applied to Docks and Floating Structures during the War," was read on March 6th before the Royal Society of Arts by Mr. G. A. Maunsell, B.Sc., M.I.C.E., Consulting Engineer for Design and Construction of Admiralty Reinforced Concrete Floating Docks. The lecture was illustrated by films and lantern slides, which are not reproducible in these columns, so that it is only possible to give some brief outline of the scope of the subject dealt with by the lecturer.

He said that whereas floating docks in the past had been constructed of steel plating, the scarcity of that material in war-time necessitated the provision of a substitute.

"The substitute material," he continued, "which we had under consideration in this case was reinforced concrete, not because we had any particular predilection in favour of that material, but because there really was no other practicable alternative."

"Where cost was concerned, the cost of reinforced concrete usually compares fairly closely with cost of steel; that is to say, you can usually build a structure in reinforced concrete at about the same, sometimes more, sometimes less, cost than in steel. There seemed, therefore, to be a fairly good *prima facie* case based on the supply of labour, of material, of transport and cost for substituting reinforced concrete in place of steel as the structural material, but the real crux of the problem then arose."

"The real crux was whether concrete was a suitable material, whether it could, in fact, be designed to make a satisfactory floating dock, and the further problem was whether a concrete floating dock could possibly be built in a very short time. The time factor was particularly pressing, because unless concrete docks could be built in very much quicker time than steel docks the whole idea of the substitution would have little value."

"Previous experience on these lines of investigation was not very encouraging. One concrete dock had been attempted, but it had taken a long time—over two years—to build. Concrete construction must also of necessity be considerably heavier than steel plate construction, and this seemed to present, at first sight, an almost insuperable objection to the substitution of concrete for steel."

"That it did turn out to be possible to produce very serviceable reinforced concrete floating docks which were very nearly perfect in the technical sense and which were, in fact, built in a

small fraction of the time that had hitherto been regarded as necessary to build either a steel or a concrete floating dock, was due to a long train of antecedent study and to the development of a constructional technique that had been lying dormant for a longish time. In addition to this antecedent study there was one other very important factor in our favour. We possessed the great advantage of having foreseen the contingency that might arise and of having prepared for it. More than 12 months before the demand for large numbers of floating docks actually arose, the answer had been thought out.

"The big demand really came in the summer of 1943, shortly before the invasion of Europe, but already in the summer of the previous year, that was in the summer of 1942, my colleague, Sir Leopold Savile, and myself in conversation with the then Controller of the Navy—the late Admiral Sir Frederick Wake Walker—had mentioned that we believed we had evolved a technique whereby floating docks could be built in concrete with extraordinary speed without using steel plates and without using skilled shipbuilding labour. When, therefore, the urgent call for docks did come in 1943 we were ready to meet it, and the Controller of the Navy knew where to look. That was our great advantage."

"The reinforced concrete floating dock which was built inside the basin consists of a flat bottom, a nearly flat pontoon deck and flat strips of deck along the top of the side walls. Connecting these horizontal or near horizontal members are a multitude of vertical or near vertical walls and bulkheads. The essential feature of the technique we used was to precast all the vertical members in the form of flat slabs lying flat on the ground, then to lift them up and stand them upright on the bottom floor, and after that to run in the concrete forming the horizontal floor and decks, and also the concrete in the joints between the slabs."

"The custom was first to precast the complete number of slabs required to build one dock, and then to lift these slabs by means of cranes and fix them upright in the basin. It usually took two to three weeks to precast the slabs and three or four days to lift them and fix them—three or four very busy days. After that it took about four weeks to pour the horizontal concrete and to pour the concrete in the numerous vertical joints where the edges of two, three or four slabs jointed together. While this was going on the pumps, pipes and valves were fixed, also fenders and other fittings too numerous to mention. Testing the dock followed, and all docks passed their tests very satisfactorily."

#### Falmouth Harbour Appointment.

Captain James William Hammill, O.B.E., of South Shields, has been appointed harbour master at Falmouth. During the war he received three awards for his services while in charge of craft.

#### Southampton Harbour Dredging

The Southampton Harbour Board have assigned a dredging contract for the extension of the Lower Swinging Ground in order to facilitate movement of the *Queen Mary* and *Queen Elizabeth* into their berths at the Southampton Docks.

In pre-war days, the captains and pilots of the *Queen Mary* frequently commented on the very restricted space available in the Lower Swinging Ground, and when the *Queen Mary* and *Queen Elizabeth* started operations from Southampton last August the desirability of extending the area of the Lower Swinging Ground was again raised. Although these vessels have been docking and undocking without any difficulty, the Southampton Harbour Board fully realise that the space in the Swinging Ground is inadequate to enable these vessels safely to manoeuvre when leaving the ocean dock other than in exceptionally fine weather, and the Board has now decided to enlarge the Swinging Ground so as to provide the requisite space for the easy manoeuvring of the largest vessels in the world in all kinds of weather.

The Board considered three schemes for extending the Swinging Ground and eventually decided upon one which will provide a parallel extension of 160-ft. width of the present Western boundary of the Swinging Ground. This area will be dredged to give a least governing depth of 36-ft. at L.W.O.S.T. with slopes dredged to a 1-in-3 declivity from the new margin. The estimated quantity to be removed is 350,000 cu. yds. measured in situ.



## Notes of the Month

### Retirement of Dock Official.

On the occasion of his retirement after 34 years service at Avonmouth, Mr. G. T. Ryan, docks superintendent, has been presented with an arm chair.

### Southampton Docks Appointment.

Mr. J. H. Jellett, O.B.E., B.A., A.M.I.C.E., has been appointed deputy docks engineer, Southampton, by the Southern Railway Company.

### Galway Harbour Board.

At a meeting of Galway County Council it was decided, subject to confirmation at the annual estimates meeting, to provide £1,446 as a grant to the Galway Harbour Board. A similar grant was made last year.

### The Dortmund-Ems Canal.

It was announced in mid-March that after a period of intense work under skilled direction, a length of 120 miles of the Dortmund-Ems Canal, one of the most important of German inland waterways, had been opened to traffic after twelve months of closure to navigation following the destruction wrought during the war and particularly by reason of defensive measures by the German army during its concluding stages, when practically all the bridges were destroyed.

### Indian Port Development.

The Government of India have appointed a Technical Committee on Ports, under the chairmanship of Sir Godfrey Armstrong, to investigate whether a sheltered deep sea port on the East Coast of India for large ocean-going ships at all seasons of the year is required and, if required, what measures are necessary for establishing it. The committee will also consider whether there is any justification for converting minor ports on the Coast of India into major ports, whether there should be any other projects for the construction of major ports, and what steps are necessary to develop existing ports to meet the probable demands of the coastal shipping traffic.

### Death of Distinguished Italian Harbour Engineer.

We have just learned of the death of Commendatore A. Albertazzi, an Italian Engineer of distinction who was Director of Port Works at Genoa, where he carried out an extensive programme of important extensions and improvement works during the past 20 years. Some of these works have been described in past issues of this Journal and he himself has contributed an article on a large new graving dock at the port. His health unfortunately suffered from the distressing experience of the bombardment of Genoa in October, 1942, when he was driven from his home and his duties and had to take refuge elsewhere in the Riviera whence he was further driven in 1944. Exposure to privation, undermined his delicate constitution and he died on March 16th, 1945. He was much respected in official circles and loved by his staff for his kindly nature.

### Poster Appeal to Dock Workers.

A special poster has been distributed to workers at the Mersey-side docks, calling on them to assist by all means in their power in the increase of production, and quoting the clause in the National Docks Agreement of December 21st, 1945, which governs that agreement, as follows:—

"It is an essential condition of this agreement that there shall be a full measure of production to this end. Both parties undertake to do everything in their power to ensure that existing national and local agreements are honoured in all circumstances; that men shall work for the full period for which they are engaged, without unauthorised absences or stoppages.

"This is the obligation entered into on behalf of all dock workers. The Dock Labour Joint Committee call upon you to honour it."

### Hull Pilotage System.

The Humber Conservancy Board has adopted a recommendation of the Pilotage Committee that they consider the time is not yet opportune for the reorganisation of the pilotage system. A recommendation to leave the Bull Lightship on station and to re-establish the Spurn Lightship as soon as practicable was approved.

### Improvements at the Port of Stockholm.

Plans are under consideration for the extension and modernisation of the Port of Stockholm. During the last few months the trade of the port has been rapidly increasing and it is contended the equipment available at present will not be sufficient to meet future requirements.

### Dredging Plant for Port of Liverpool.

The Mersey Docks and Harbour Board at their meeting on February 14th, sanctioned the purchase of a new twin-screw hopper grab dredger from Messrs. Ferguson Brothers (Port Glasgow), Ltd., one of two such dredgers to be acquired, together with two hopper barges and a bucket dredger forming the immediate requirements of a dredging programme to be carried out during the next few years. An innovation in the new dredger will be the introduction of Diesel-electric propelling machinery as well as improved quarters for the crew.

### Welsh Port Prospects

Dealing in the House of Commons during a recent debate with the industrial future of Welsh ports, Mr. Barnes, the Minister of Transport, said he hoped in the next year or two, by the development of the road transport system right through Swansea, Port Talbot, Cardiff, Newport and across the Severn, and ultimately by a fast motor-road through to the Midlands, to bring that group of ports into equal accessibility as Liverpool or London to that area. Much will depend on the initiative and drive of the people in the locality. The Government was providing equal facilities.

### American Port Development

At a recent public-hearing, the City of Everett on Puget Sound, Washington, U.S.A., put in a strong plea for port expansion in the city area. The Everett Port Commission asked for a channel 700-ft. wide and 5,500-ft. long, extending from the south end of the present jetty northwards to a proposed draw-bridge site, to give deep water access to a port terminal.

The project would require 5,000,000 cu. yds. of dredging, costing about \$750,000, to be borne by the Army Engineers. The proposed terminal expansion in connection with harbour improvements would provide the city with 11,000-ft. of additional navigable water shoreline.

There would also be provided 1,200-ft. of deep water dockage and an additional 1,000,000 sq. ft. of filled terminal area.

### Resumption of Harwich Train Ferry Service.

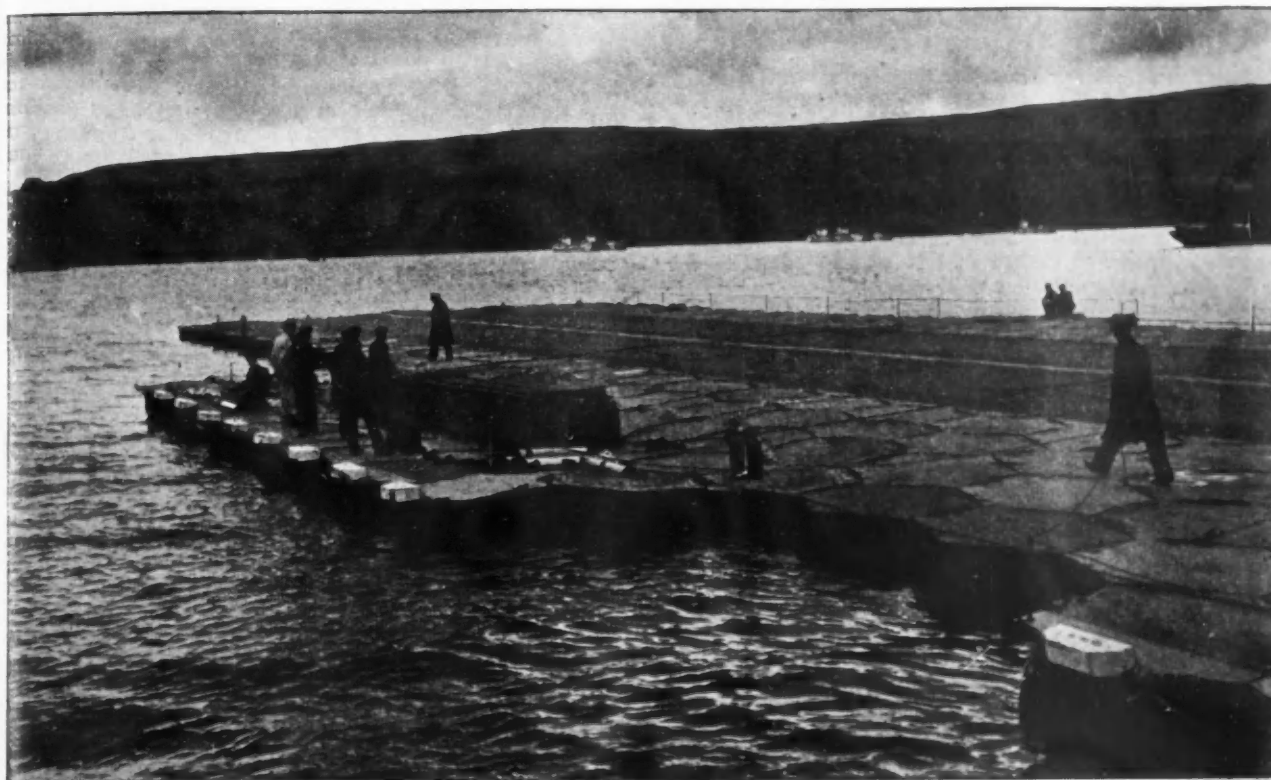
The L.N.E.R. proposes to take steps to restore, as soon as circumstances permit, the train ferry service which operated for many years before the war between Harwich and Zeebrugge and provided facilities for the transport of merchandise by through wagons between this country and many parts of the Continent of Europe. Of the three ferry boats which were working before the war, two were sunk by enemy action and the third is still on Government service. As a first step towards reinstatement of the facilities, the L.N.E.R. has placed a contract with Messrs. John Brown & Company, Limited, of Clydebank, for the construction of a new train ferry capable of carrying approximately 1,000 tons dead weight of traffic loaded in either rail or road vehicles. The ferry is to be fitted with Sulzer type Diesel engines of 3,200 h.p. driving twin screws for a speed of 13 knots on service. It is understood that the ferry terminal at Zeebrugge has not been seriously damaged and the necessary repair work will shortly be taken in hand. The terminal at Harwich is intact.



# Floating Wharves and Jetties

## Novel Application of a Device used by Aircraft during the late War

By R. M. HAMILTON, M.A.



General view of the landing end of the Lily Floating Airstrip, showing extra units added to the sides to carry the arrester gear. Note the depression caused by the thirty foot long arrester ram, which weighs about 8 tons

### General Theory

**A**RIGID floating structure must be strong enough to withstand the large beam stresses set up by waves. Many people think that huge ships like the *Queen Mary* have almost reached the limit of length; the "Hogging and Sagging" forces as an Atlantic roller passes under them are enormous and with their great depth and numerous cross and longitudinal stiffeners they probably compare in strength as beams, to the vast columns which are the modern skyscrapers. If instead of resisting these forces, a degree of flexibility is introduced into the structure, the forces diminish rapidly.

The wave force is that due to the difference between the shape of the wave and the shape of the floating surface. If then enough deflection is permitted to reduce the bending moment due to the worst possible wave, without overstressing the material, a permanent structure can be built with a known factor of safety.

If the surface is perfectly flexible no forces act on it and, like a piece of seaweed, it would be unharmed by wave action, but it would not be able to support loads, and a compromise has therefore to be made.

When a surface having controlled flexibility floats on water and a local load is imposed on it, it forms a dimple. The area of the curved surface of this dimple is greater than that of the flat circle from which it is formed.

In order that this can happen the surface must contract circumferentially and stretch radially, and the amount by which

it is allowed to do these things determines the depth of the dimple. The volume of the dimple is, of course, the volume of the water displaced by the weight which causes it. The stresses due to loads, in the open sea, are generally less than those caused by storm waves. It is interesting to note that as waves increase in length the average and maximum curvature tends to decrease so that any such surface will conform more nearly to a very large wave than it will to a short, steep wave, every degree of stiffness having its corresponding "worst" wave.

The freeboard also depends upon the stiffness needed. Each degree of stiffness will tend to span a certain length of wave and the total weight of the surface and its load will be supported on the series of crests. In order to keep the deck dry, enough freeboard must be given just to clear the crests of the worst wave for that stiffness.

The design uses a hinged mosaic of hexagonal buoyancy units. The hexagon is the regular polygon with the largest number of sides which forms a surface pattern. The forces in the hinges in this pattern only vary by 15 per cent. as waves approach in any direction. The only other regular pattern making polygons are the rectangle and the triangle. In both these cases the forces vary much more as the direction of the wave alters. The necessary degree of stiffness is obtained by incorporating resilient members in the hinge system.

The size of the hexagons is determined by various practical considerations. In general the larger the unit the cheaper per

### Floating Wharves and Jetties—continued

square foot, but when the hexagons increase the dihedral angle increases for any given radius of curvature. Handling and erecting have also to be taken into account.

The size recommended is seven feet across the flats. This is convenient for rail transport. Each unit will weigh, on the average, about a ton (for normal loads), and will be three feet deep, drawing one foot of water with two feet of freeboard. These units float in stable equilibrium and a man can stand safely on one while erection or dismantling is taking place, providing that the sea is not too choppy.

The time taken to erect an aeroplane runway at Lamlash in the Isle of Arran for the Admiralty was about 40 man hours for 1,000 units. When erection takes place from a ship two men on the growing raft can assemble the units as fast as they can be lowered by derrick from the hold.

The rafts formed alongside each hold are readily joined into one raft. A feature of this type of structure is that it can be made of any desired shape and if the requirements change the shape can be altered or the size increased by fastening on additional units.

Static deck loads can be dealt with in two ways. One is for the shed or other structure to stand on a platform which in turn stands on three legs which are attached in a flexible manner to the deck. The other method which was used to carry the arrester gear on the airstrip, is to rest the load on the deck and restrain lateral movement by "fiddles" or brackets, allowing the deck to flex under the load. The arrester gear unit was 30-ft. long and 3-ft. wide and weighed about 8 tons. This load remained in position for many weeks and withstood gales.

Trucks and other wheeled machines which run on lines can be catered for; the lines being in short lengths which are welded to the top plates of the units. The articulation is not too great to allow the wheels to cross from unit to unit.

Cranes can be erected on the surface, but, for use in rough seas, a special type of crane is being developed with self-balancing means controlled by the servo-gyroscope or a similar device to prevent the hanging load from swinging.

#### Shapes of Jetties

The important point to note is that a ship when she is not sheltered, must lie at her natural angle to the shore, that is to say, in the position at which rolling is reduced to a minimum. This is achieved in the case of a single ship by having the jetty shaped to a rough semicircle. When several ships are to be moored to one straight wharf the whole wharf would be so moored that it can be turned round so as to lie at right angles to the swell, the runway leading to the shore being connected to the wharf by a turntable.

When a ship lies in this way, "boomed off" from the "Lily," as the floating platform is termed, the relative movement is small, as the pitching of the ship and the rise and fall of the "Lily" tend to coincide amidships and never diverge by as much as the pitch of the ship.

#### Floating Wharves and Jetties

The type of surface just described lends itself well to affording harbour berthing where no natural haven exists. There are many seaside resorts which could make most profitable use of such floating jetties. Seaborne coal, fish and many other commodities could be brought into the town much more cheaply than by road or rail. Tourist traffic and pleasure promenades would add to the revenue. The provision of yachting havens would also greatly improve the local amenities and at the same time, when a number of these havens are available round our coasts, they will make yachting a safer and therefore more popular sport.



Close-up of Lily Units, showing Wooden Fenders and a Heavy Girder resting on the Raft

## Floating Wharves and Jetties—continued

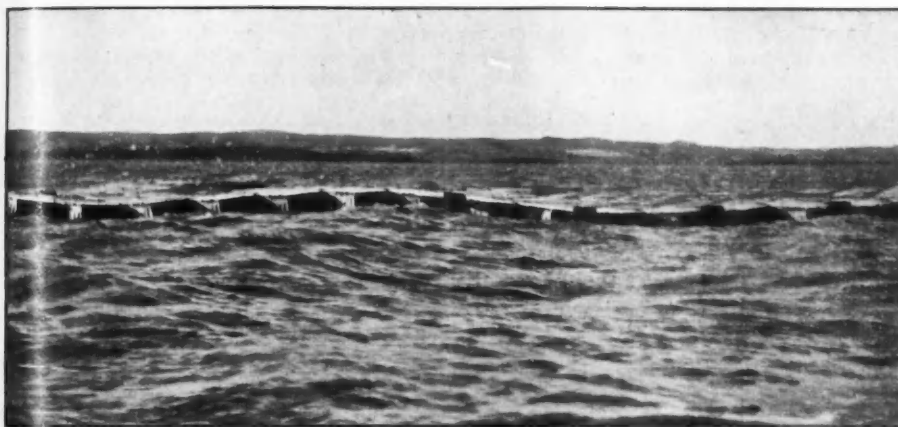
Safe bathing pools can also be made, using light lattice grids suspended from the surrounding "Lily" units as a "bottom."

The fact that the surface rises and falls with the tide makes it ideal for anglers and, as a promenade, it is very much more fun than an ordinary pier. Enough movement takes place in a swell to give a nautical roll to a walker without the danger of a ducking. Bumper cars and similar devices have a much greater appeal when actually afloat and moving with the sea.

Flying boat loading-bays can also readily be made with these units.

### Connection with the Shore

There are two methods of connection, according to the type of coast. If there is virtually no foreshore and the water is deep right up to the land, a ramp hinged at the land end and resting on the raft at the sea end is used, exactly like those used for floating landing stages for ferry boats, etc. The component of the weight of the ramp which is carried by the raft can easily be



"Lily" in 90 m.p.h. Northerly Gale on Loch Ryan with waves running straight in from the sea. No wave damping devices were used.

calculated and allowed for. The second and more frequent case is where there is a stretch of mud, sand or shingle between the sea and the shore. In this case the line of the beach is smoothed out as far as possible and the runway is laid from well above high water springs to the jetty or floating island. When shallow water waves are rolling in to the beach, the "Lily" surface prevents the formation of a comb. The swell is squeezed between the surface and the bottom and its energy is gradually dispelled. The bottom of the units which form this ramp are strengthened and fitted with shock absorbing means when the beach is hard. Normal breakwaters should be used where a sloping swell occurs, running out parallel to the runway and fairly close to it. Where the foreshore is mud the units will float off as the water rises, their buoyancy being greater than the mud suction.

### Moorings

Towing trials have shown that up to a tidal stream velocity of three knots no difficulty arises. In those rare cases where the speed is higher than this, it may be necessary to have the leading edge inclined at an angle to the vertical, to stop the tendency to tow under. At two knots the resistance was found to be 1/12 tons per 1,000 square feet of area. This is, of course, greater when a long leading edge is presented to the stream, as in the case of a narrow roadway crossing the stream. To prevent buckling, a long strip should be moored at about every 300 feet. Moorings can be of normal type, and in general the ships which lie alongside will be independently moored and only lightly held in relative position to the "Lily," being boomed and sprung off. Where very strong forces are met with, it is as well to attach the craft at a number of points to spread the load. Care, of course, must be taken that when the tide falls the cables do not foul ships alongside.

### Bridges

For rivers, estuaries and across straights, or to islands, bridges can be built of "Lily" units at a fraction of the cost of span bridges. They are also practicable in places where the depth of water is too great to build a pier, and without the danger of storm damage inherent to pontoon bridges. The ramps and moorings follow the practice described.

In cases where shipping uses the waterways, a sliding section of the bridge is made. The main roadway has a gap for ships and another portion is slideably mounted parallel to the roadway and longer than the gap. This is moved to open and close the bridge. If two such bridges are used some distance apart, opening and closing at regular intervals, ships can time their arrival to suit the opening time of the bridges and go straight through while vehicular traffic can be diverted over one or other bridge so as to have an uninterrupted run over the bridge to which they are directed.

### Ferries

When the width to be crossed is great and the traffic too small to justify the capital cost of a bridge, a chain ferry can be constructed out of these units; which has the advantage of being able to be enlarged either in length or width to suit the traffic. For instance, where a ferry carries a large summer tourist traffic and just a few local residents in winter only the necessary number of units to deal with the immediate traffic need be dragged backwards and forwards.

### Buoyant Causeways

"Lily" bridges can be used to carry vehicles over marshes, mud flats and other boggy places where road building becomes either impossible or more expensive than the "Lily" type of roadway.

### Car Parks

"Lily" units can be used as car parks. Probably the most useful place is along the Thames Embankment, where there are hundreds of acres which dry at low tide and are not used by shipping. This area, when covered with "Lily" rafts, could make a very great difference to the real problem of London's congested streets.

### Typical Example of a Scheme for a Particular Problem

So far I have tried to explain the general theory and give brief descriptions of the various non-air-strip uses to which this surface lends itself. I should like to conclude with a rather more detailed explanation of how we are proposing to deal with an enquiry from a coast line quarry.

The problem is this: In a spot remote from road and rail facilities there exists a granite mountain above a rock cliff which rises nearly vertically 155 feet from the sea bed and has 15 feet of water at its foot at low tide, shelving to 22 feet at 60 feet from the shore. The coast is quite unsheltered and open. The proposed requirement is to load three coasters per working day, each carrying between six and eight hundred tons of screened granite road-metal.

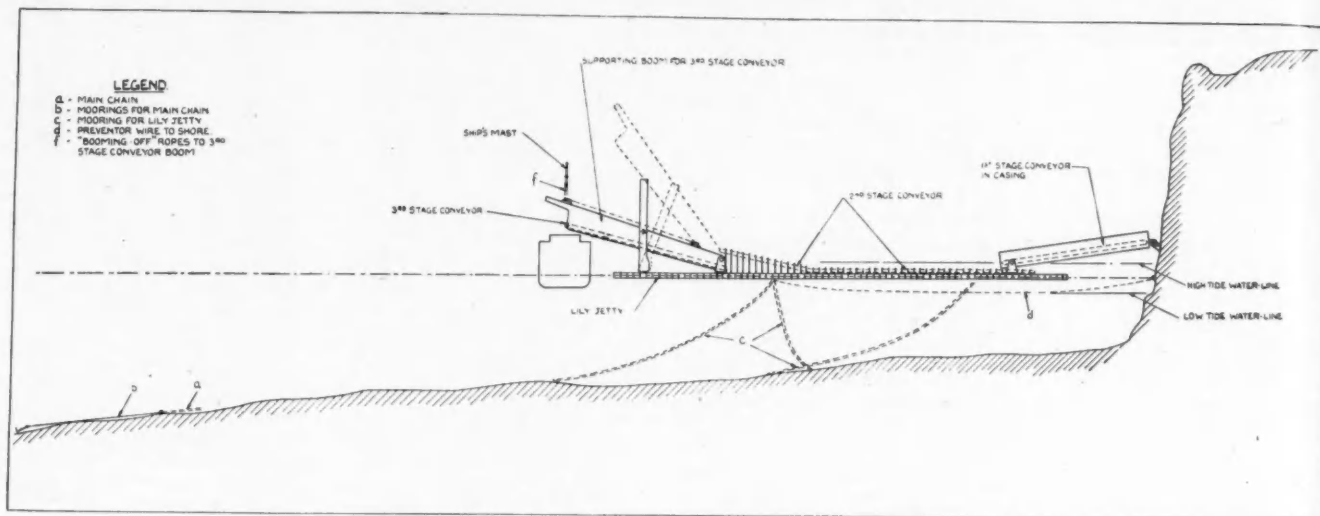
With an on-shore gale, waves may be expected, having an average height of 15 to 20 feet breaking against the cliff with a maximum height of about 30 feet. With a gale blowing along the coast the waves will be even higher, but will not break on the cliff. It is desired to find a scheme which will be safe for the ship and jetty and which will have the greatest number of days availability throughout the year.

We are not concerned with the conveyor and hopper system which brings the screened stone nearly to the cliff bottom, close to the point where the loading jetty will be moored.

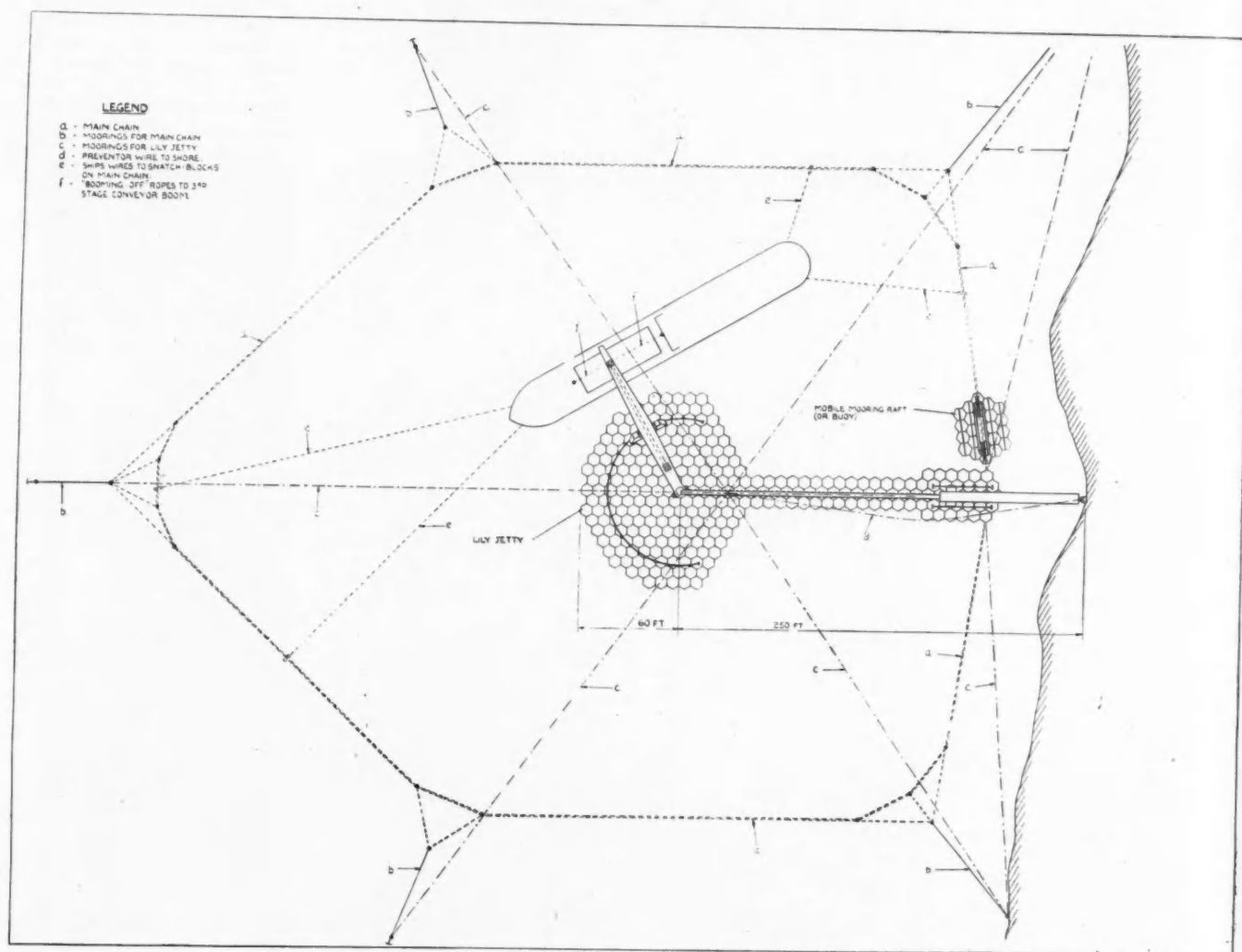
The sketch shows that the jetty has the shape of a fan with



### Floating Wharves and Jetties—continued



"Lily" Jetty for Stone Quarry—Elevation on Conveyor Line



Plan of "Lily" Jetty for Stone Quarry

### Floating Wharves and Jetties—continued

a long handle, having a bulge at the shore end. The fan, which faces out to sea, has a radius of about 60 feet for the semi-circle and is then straight sided for 10 feet, after which it narrows at 60 degrees to the axis, when it becomes some 20 feet wide, the shore end bulge being 33 feet wide. This, the handle part, is about 160 feet long, the whole jetty being about 260 feet long and 120 feet wide at its widest part.

This structure is moored about 60 feet from the cliff and as the tide rises and falls it will move a few feet in or out and also along the shore.

A second smaller raft, made of "Lily" units is used for mooring the ships. This moving raft will be motor driven along a long chain in much the same way as a chain ferry is propelled, the main difference being that this long chain starts near the shore end of the main jetty and lies nearly along-shore for about 200 feet, where it meets and is joined to a mooring chain leading to a ring on the cliff. At this junction the chain turns out to sea for about 300 feet, where it meets an anchor cable and again turns through some 45 degrees to continue for about 300 feet to a point some 600 feet off shore in line with the jetty, where it meets another anchor cable. It then returns to the opposite side of the jetty from that of its start, having followed a similar route to that on the other side of the axis. If this chain, which is about 270 fathoms long, is made of long links and runs over chain sprocket wheels with sprocket teeth missing in each wheel, the mooring chains can be shackled into a link which corresponds with a missing tooth; the raft will be able to wind itself round to any position on the chain, passing the shackles without fouling them. The proposed method of using this raft is as follows. When a vessel is approaching with a view to loading, the raft sets off round the chain to a point rather further than the windward tangent to the semi-circle of the main "Lily." There, a short wire leading to a snatch block is shackled on to the chain. Note that if all links which are multiples of the number of teeth in the raft sprocket wheel counting from the missing tooth are marked and only these used for shackling, the wheel can pass them without jamming. Four such wires are carried on the raft. The vessel will approach the raft straight into the wind and hand the man on it two bights of the two forward mooring wires. The snatch block is attached to one bight. This wire leads from a bollard through the snatch block and back to the ship's forward winch. The moment this has been done the vessel is moored to the chain by one forward wire. The second bight is then made fast to the second snatch block and a long light line is led from the stern of the vessel to the raft. The raft then moves along the chain and shackles on the second bow wire; the vessel then swings to two bow wires and it can adjust itself forward, astern, and to a certain extent to either side. The raft then travels round the chain till it gets to leeward of the ship, the long line being paid out as it goes. Two stern wires are passed to the raft and attached to the chain in the same way as the bow wires were. The ship is now moored fore and aft into the wind and can drop back until the first hold to be loaded is opposite the nearest point of the semi-circle of the jetty; she can then warp herself sideways until she is a few feet only away from the "Lily."

Meanwhile, the mobile buoy, or raft, has returned to the main "Lily," and its operator is ready to help in running the loading conveyors.

It will be noted that the ship is free to leave at any time by simply slipping the four wires which run out through the snatch blocks. The raft can then run round the chain and recover these blocks.

If the wind is off-shore the sea will be calm, and it will be quite easy for the raft to make fast the stern wires first. The ship will then swing round and be facing out to sea ready to leave as soon as she is loaded.

If the wind and tide change during the loading so much that the vessel starts to roll and the limiting position of the wires is reached, the raft can proceed round the chain and shift them until they again stretch out at equal angles to the equilibrium centre line of the ship.

The chain is held by three anchors and two shore rings and

these are also used to moor the main "Lily" jetty, care being taken that these mooring wires, when they pass beyond the semi-circle, are deeper than the ship.

The plan was worked out for a coaster 220 feet in length and 30 feet beam, and anchors of some three tons weight with the appropriate cables are suggested.

The conveyor system proposed, is divided into three stages. From the cliff to the shore end of the jetty, along the jetty to the centre of the semi-circle and from there over the ship's side into the hold.

In all three stages standard 24 inch belt conveyors are used with troughing idler pulleys every 3½ feet and return idlers every 10½ feet. Each conveyor is individually driven at about 300 feet per minute. The first stage consists of a box like beam 90 feet long. The sides of the box carry the conveyor rollers and the top clears the stone in transit.

The upper surface of the top is ribbed to form a gangway, the sides being extended up for added beam strength and to form hand rails. The whole box is made of mild steel plate. At each end, it is swung from a ring. The land end ring is attached to a hook which is secured into the rock. The jetty end ring hangs from a gantry which runs on rails on either side of the second stage conveyor.

The bottom of the box at the land end is 20 feet above high water springs and the other end just clears the second conveyor. With a rise and fall of the tide of 17 feet and a 30 feet swell the gradient will vary from 3 degrees to 35 degrees so that the stone should never slide on the belt.

The box not only supplies the beam strength to span the 90 feet but also prevents the spray from the waves breaking at the foot of the cliff from washing the stone off the conveyor. The total weight of this structure when loaded will be under 10 tons, of which rather more than half is carried by the "Lily" units.

When the jetty is not in use the whole conveyor could be raised by a wire rope attached to a point near the cliff top and to the seaward end ring.

The second stage conveyor is supported on stanchions welded to the unit top plates. As the conveyor nears the centre of the semi-circle the height of the stanchions increases so as to raise the delivery point in order that the load may be fed by gravity on to the final conveyor.

The final stage consists of a conveyor 90 feet long, slung from a 100 feet long lattice beam and carries the stone from the centre of the semi-circle to the hatch of the steamer to be loaded.

The lattice beam is pivoted at the centre of the semi-circle in such a way that it can rotate through the semi-circle and can move through an angle of 45 degrees in the vertical plane from, say, 10 degrees to 55 degrees from the horizontal. A gantry is provided which runs on a semi-circular rail at 50 feet radius from the pivot. The beam is carried in a cross-head which is free to slide up and down this gantry which has a double flange wheel on either side. Also sliding up and down the gantry are two water tanks attached to the cross-head by wire ropes over pulley wheels at the top of the gantry. At the ship end of the beam and arranged to slide horizontally along it, is a carriage with a two-sheaved block. At a point nearer the pivot end of the beam, a second carriage having a handwheel operated chain sprocket is similarly mounted.

Arrangements are made so that either both carriages may be made to slide along the beam without relative movement, or the carriage with the sprocket may be made to slide independently of the other.

When a vessel is about to be loaded it is brought close to the jetty, in the way already described, with its hold normal to the centre of the semi-circle. Enough water is pumped into the tanks on the gantry to raise the beam to an angle such that its end is well clear of the ship. The gantry is then turned so that the end of the conveyor is opposite the centre of the hold. The ship, at this stage, is pitching but not rolling, and the end of the beam, supported by the gantry, is swaying to and fro fore and aft the ship. A rope is permanently reeved round one of the pulleys of the two-sheaved block and shackled to a chain

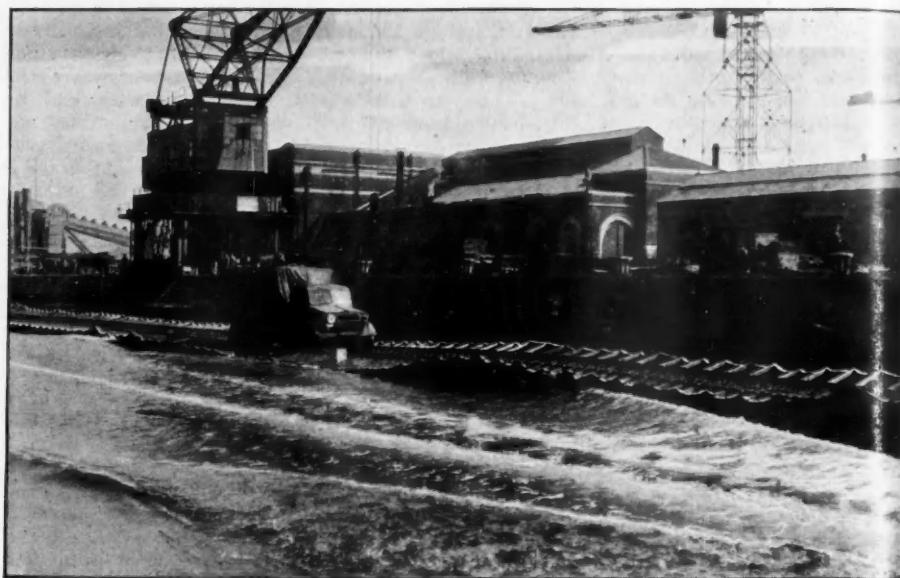
*Floating Wharves and Jetties—continued*

which runs round the sprocket and in turn is slackened to a similar rope which passes round the second sheave of the block in the opposite direction. The chain sprocket is free to slide and rotate. The two ropes are made fast, one to the mast at a fair height above the deck, and the other to a point as high as is convenient amidships on the other side of the hold. Water is then let out of the tanks and the beam allowed to lower gently. When the right position is reached, the sprocket is both locked in position and prevented from rotating. As the ship and "Lily" move, the ship end of the beam will swing to the two ropes in what little roll there is and also rise and fall with the pitch. By adjusting the amount of water in the tanks, as much of the total weight of the beam, conveyor and stone as is desired can be supported by the gantry. The other end of the conveyor is located by the pivot immediately below the delivery end of the second stage conveyor.

As the hold is loaded it will be necessary to vary the relative positions of the delivery end of the conveyor and the hatch. By sliding both carriages together, out relative to the beam, the ship will be pushed out and the stones will be delivered nearer to the jetty side of the hold. By sliding them inwards, the ship will move towards the jetty and the delivery will move to the other side of the hold. By rotating the sprocket wheel, the end of the conveyor beam will travel fore and aft of the centre of the hatch, the gantry automatically running round on its rail. The conveyor would have the usual baffles to prevent undue shock on the bottom of an empty hold.

When the first hold has been loaded the beam is raised clear of the ship and the supporting ropes freed. The ship will then be free from the jetty and haul itself along until the second hold is opposite the delivery point, after which the process already described is repeated.

An alternative scheme for handling the final conveyor is for



A lorry riding on Swiss Roll over the wake of a motor launch during trials in Portsmouth Dockyard

the conveyor beam to be supported on a three-legged structure on a small flexible raft, the diameter of the semi-circle being much reduced. The small raft's distance from the centre of the semi-circle is located by the angle of the beam.

The trunnions holding the beam near its centre of gravity, slide up and down in the same way as already described for the gantry. The advantage of this scheme over the other is a saving in area of the "Lily" jetty and that the turning of the conveyor beam by a chain will be easier than moving the gantry round the rail as it will float freely.

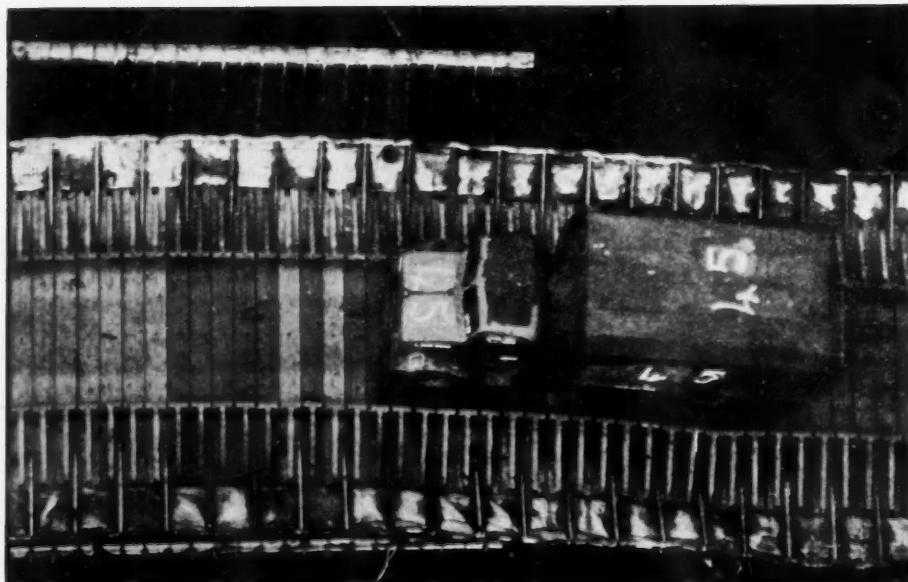
**The "Swiss Roll"**

This invention was used successfully in connection with Mulberry, an 1,800-foot long strip being laid from the shore with means for mooring landing craft at the sea end.

The theory is similar to that of "Lily" except that the bridge is rigid transversely and flexible longitudinally instead of flexing in all directions. It is therefore only suitable for single track roadways and footpaths.

The type which I designed and developed for the Admiralty was for carrying lorries of 10 tons gross weight. The roadway consisted of 3-in. planks of Douglas fir, 12-in. wide and 15-ft. long. These were clamped to two groups of five 2-in. circumference flexible steel wire ropes. Strips of canvas were fastened along the cracks between planks to prevent water squirting up. Hinged wooden and canvas sides lay out on the water on either side, making the overall width 20-ft. Hinged kerbs made a track for the vehicles which steered them, even in rough seas.

When no load was on the bridge the deck floated about half-an-inch above the water level. The wire ropes were put in tension (about 2 tons pull in each rope). When a load was on the bridge a shallow trough was formed. The hinged sides are so balanced that they rise out of the water when the track is pressed down and thus form a



A view of Swiss Roll from the air, showing a lorry being steered by the kerb round an artificially made bend. This gives an idea of the lay-out of the bridge. The tension wires lie under the deck planks below the wheels



### *Floating Wharves and Jetties—continued*

shallow boat which travels along with the vehicle. When the lorry stands still on the bridge in choppy seas conditions the depression gradually fills with water but several hours must elapse before it becomes water-logged and there is plenty of time to tow away a broken-down vehicle. The bridge is self-emptying; as soon as the load moves away all water flows out over the flat sides.

It is interesting to note that the equation which gives the shape of the tension curve is the same as that given in text books for the meniscus curve obtained when a needle is floated on water, the tension in the bridge per foot of width being substituted for the surface tension of water.

The tension is by no means critical, as the draft under the load is a function of this tension and an ample margin of safety in the hinged sides allows a big variation in tension.

Various tensioning methods were tested. A simple hanging weight over a supported block keeps the tension constant during the rise and fall of the tide. In other cases an ordinary winch can be used.

The kerbs are hinged and when turned outwards lie flat so that the whole structure can be rolled round a floating roller.

It rolls and unrolls easily, using endless strops on pulleys at each end of the roller. The water acts as a floating bearing and the action is nearly frictionless.

It is interesting to note that the huge rolls of pipeline which enabled Pluto to be laid across the Channel were another development of the same idea.

Peacetime uses for Swiss Roll are various. Temporary bridges during reconstruction work, bridges from ship to shore enabling work to be done on vessels lying to buoys, and piers leading to "Lily" islands or jetties where the traffic does not justify the extra cost of the more permanent "Lily" structure.

Small Swiss Rolls for pedestrian use offer many attractive features. The cost is very low and such a walkway can run straight from a moored vessel across the intervening water and mud to the nearest dry land enabling people to walk dry shod at all states of the tide.

This has a special attraction for houseboats and yachts. If the yacht leaves the mooring, the Swiss Roll can be rolled up and left at the mooring until required again. These footways could also usefully be placed leading over mud to a landing raft to enable dinghies to come ashore in tidal water where there is no "hard" or jetty.

## *Tyne Improvement Commission*

### *Statement by Chairman*

In presenting the Annual Accounts for last year to the Tyne Improvement Commission, the Chairman (Mr. W. A. Souter) made the following observations:—

The receipts at £1,185,687 and the Expenditure £1,223,920, both constitute a record; the deficit for the year was £38,233; we, however, reduced our debt by £163,758.

It is possible to give a fuller account of what has been happening to the trade of our river now that the reasons for security have been removed.

In spite of many difficulties, the Tyne has come through the war well. We have been able to pay our way. Our debt, which was £3,462,526 at 3rd September, 1939, has been reduced to £3,332,956 at the end of last year after incurring Capital Expenditure of £630,000 gross and £309,000 net on improved facilities during the same period. Generally, we have come through the war with our financial position not only unimpaired but strengthened, and with our credit never higher.

#### *War Damage*

In spite of our proximity to the Continent, our port installations have come through practically unscathed; it would be interesting to elicit the information during the Nuremberg trials why we should have suffered so little harm when so many ports received damage amounting to millions of pounds.

One of our problems yet unsolved is the payment of this war damage; the Government intention is that the ports, like the public utility companies, shall pool their proportion of the cost. I view

this proposal with apprehension as it would mean an increase of our debt with annual charges for interest and redemption thereby making a reduction in dues and charges which is so desirable in the interests of our overseas trade more difficult to effect. I would urge that this consideration should be carefully borne in mind and I would stress that the ports, owing to their concentrated position, importance and easy detection suffered more attacks and damage than any other section of our national economy.

#### *Trade of the Port*

I trust that you will agree that a reduction in dues which now stands at 100 per cent. above pre-war, should be regarded as our prime objective rather than an increase in port facilities. With the considerable additions and improvements carried out between the two wars, and at the beginning of the second war, the Tyne possesses excellent facilities adequate to cope with any volume of trade that appears in sight, and we should burden ourselves unnecessarily by adding to them at present. Should the volume of trade expand beyond our present expectation, then we are ready to deal with it and have schemes prepared for such development.

During the war our trade has undergone many changes. Coal and coke shipments have been greatly reduced; compared with the 12½ million tons in 1938, not in itself a good year, the quantity shipped last year was only 5,092,235 tons, and of this nearly 4 million tons went to London, practically the same as in 1938; only 13 per cent. went abroad, namely, 667,738 tons, whereas in 1938 we exported 8,085,311 tons.

Iron ore imports were to some extent brought by rail from west coast ports; now, of course, they are coming direct to the Tyne. Timber imports were greatly reduced because the Baltic was closed to us. We expect much larger imports of wood this year, they would be still larger if only we could send coal in exchange for them. As it is, Sweden is reported to be forced to burn large quantities of wood so reducing the amount she can send us because we cannot send her coal. Just as the Argentine has been forced to burn hundreds of thousands of tons of maize and linseed which Europe so sorely needs because she has been unable to import coal. The situation would be "Gilbertian" were it not so tragically serious.

During the war our reduced traffic in coal, iron ore and timber was partly compensated by a large traffic in war-like stores and equipment which the Tyne showed that it possessed the facilities to handle efficiently and expeditiously. This traffic is now passing away, and it remains to be seen whether our resumption of normal imports and exports will be enough to fill the gap. There appears to be no hope of coal doing so this year, and as the transition from a war to a peace economy is only proceeding slowly, it would appear that this year will be rather a difficult one. I am more optimistic regarding 1947.

These generalisations on our trade are confirmed by the figures which show that our imports of general merchandise were 1,365,342 tons in 1945 compared with 2,223,665 tons in 1938; on the other hand, our shipments of general merchandise were last year double the figure of 300,000 shipped in 1938; sulphate of ammonia, a new trade, contributed largely to this increase.

The new industries coming to our district are very welcome as they provide fresh channels of employment; in course of time no doubt they will contribute their quota to our trade in general merchandise, but, so far, I do not see any new industry which will add a large volume to our exports, and that is what we particularly need.

#### *Nationalisation of British Ports*

The Government has announced its intention of taking over the docks and harbours of the country. Whilst I consider that a measure of Government control would be desirable to prevent an excessive provision of port facilities with the consequent increase in charges which would ensue, I venture to express the hope that the Government will not interfere with the structure of the trust ports such as the Tyne Commission. Its members are composed of representatives of the boroughs on Tyneside and of dues-payers in equal numbers, thus representing all sections of the community; this system has worked well now for nearly 100 years; moreover, it has shown itself, as have the other trust ports of the country, extremely adaptable to the unprecedented changes which have taken place during the war in the variety, quantity and description of our seaborne trade.

## New Aids to Navigation in Harbour Waters

### Development of Radar at Ports for Merchant Shipping

Radar, which is the American name for radio-location, is a new development of science which has been brought to the fore by war-time needs. Realising the potential value of the new invention to ports and shipping, a Government Committee was set up in 1944 to make recommendations for the development of radar as an aid to navigation in coastal waters. Consultations were held with representatives of Shipowners and Dock and Harbour Officials, and a prototype radar set was developed which, after tests, was released to radio manufacturers. The radio industry is receiving the assistance of Government research stations and until the improved sets are in production, the Admiralty is lending to shipowners sets which were made for the Royal Navy.

The scientific and technical work is now being carried on by a Joint Ministry of War Transport and Admiralty Committee on Radio Aids to Marine Navigation. The members comprise: Sir Robert Watson-Watt, (Chairman), Admiralty; Captain F. J. Wylie, R.N. (deputy-chairman); Mr. C. S. Wright and Mr. C. E. Horton; General Post Office—Colonel A. H. Read and Mr. A. H. Mumford; Department of Scientific and Industrial Research—Dr. R. L. Smith-Rose; Ministry of War Transport—Commander D. A. Henderson, Captain J. C. Taylor and Mr. J. W. S. Pringle. The secretary is Mr. A. W. Clarke and the assistant secretary Mr. P. G. Oates, both of the Ministry of War Transport, Berkeley Square House, London, W.1.

Experiments are now in progress to modify buoys so that they can be more readily recognised by radar, but the methods under review are not confined to radar, and include radio methods of fixing the position of a ship at sea, some of which are developments of the pre-war direction-finding apparatus. Long-range aids are likely to be of more use to aircraft than to ships, but short-range aids of remarkable accuracy are now possible.

The Minister of War Transport has appointed an Application Committee to consider the practical application of new developments in shore-based facilities for radio aids to marine navigation and in the associated shipborne equipment.

The members comprise: Ministry of War Transport, Mr. W. Graham (Chairman), Mr. A. W. Clarge, Commander D. A. Henderson, Captain J. C. Taylor and Mr. C. B. Glenister; Chairman of Scientific Navigation (CRAMN), Sir Robert Watson-Watt; General Post Office, Colonel A. H. Read; Admiralty, Captain C. J. Wynne-Edwards, R.N.; Air Ministry, Air Vice-Marshal W. E. Theak; Ministry of Civil Aviation, Mr. C. Clarke and Mr. W. A. Duncan; Ministry of Supply and Aircraft Production, Mr. H. Larnder; Department of Scientific and Industrial Research, Mr. R. L. Smith-Rose; Chamber of Shipping, Colonel B. S. Millard and Mr. C. E. Wurtzburg; Liverpool Steam Ship Owners' Association, Colonel A. G. Bates; Trinity House, Captain T. L. Owen; Northern Lighthouses, Mr. J. Oswald; Irish Lights, Dr. J. H. J. Poole; Dock and Harbour Authorities' Association, Captain H. V. Hart and Captain W. L. Sinclair. The Secretary is Mr. P. G. Oates, of the Ministry of War Transport.

Great interest in these developments has been taken by officials of the Mersey Docks and Harbours Board, and a Control Room has been provided in their offices at Liverpool. Here, charts of the port and its approaches, will show the position of every ship, buoy, wreck or other obstruction. A radar set, lent by the Admiralty, has been installed for test use, and from the experiments already made, it is expected that a system of control will be devised that provides by means of a shore-based radar station, a complete view of the entrance to the port to enable visual watch to be kept on every ship entering or leaving. In addition, it is claimed, any displacement of buoys or lightships, any casualties to vessels, or any vessels wandering from the channels in bad weather could be observed. Also, in the event of a number of vessels wishing to enter the port at the same time, each could be called in by wireless as required.

If the experiments prove successful, these new facilities will be

of great assistance to harbour masters who will be able to ascertain the exact position of every ship and also be able to estimate the time that each would take to reach its dock.

Using Liverpool as an illustration, the system that will probably be used, is as follows: A pilot would board a ship lying off port, taking with him a portable wireless set. He would report by wireless the arrival of his vessel at the Bar and would then be told whether to anchor at the Bar or to enter the channel. The shore-based wireless station would observe his position at the Bar by means of radar, and have definite identification of the vessel from the pilot's wireless report. If the weather were very bad the harbour master and shipowners could be advised of the progress of the ship and the chances of docking. The pilot could also be advised as to the state of the channels with regard to other traffic in the vicinity and in the river. He could also be informed as to the state of visibility at the entrance of the river. As a result, the shore station would have a complete check on every vessel from the moment she arrived at the Bar, and also, although this was not so important, on every vessel leaving the port.

### The "Decca" System for Hydrographical Surveying

Harbour officials are also interested in "Decca," a system of hydrographical surveying which plots a ship's position on the ship itself. It has been arranged for demonstrations to be made at Liverpool during May by the Decca Company and the Dock Board is lending one of its ships for this purpose.

## Institution of Civil Engineers of Ireland

### Excerpts from Presidential Address relating to the Port of Dublin

On November 5th, 1945, Mr. N. A. Chance, B.A., B.A.I., took office as President for the current year of the Institution of Civil Engineers of Ireland and delivered a lengthy and interesting address, in the course of which he made the following remarks in reference to development works carried out during the 17th and 18th centuries at the Port of Dublin.

Up to the beginning of the 19th century, most of the vessels entering Dublin lay either in the river below Ringsend, or in the lee of the ridge of raised beach which runs from Ringsend to Irishtown. Here they unloaded into lighters or gabbards which carried their goods to the City wharves. Landward communication was either along the ridge to Irishtown and thence by a ford later replaced by a bridge which crossed the Dodder close to where the railway does to-day, or else was by special carriages with high seats which at low tide plied in great numbers over the tide-washed sand flats crossed by the many streamlets intersecting the delta of the Dodder.

As late as 1673 plans were prepared for a Citadel of Dublin to be built (as a defence against the Dutch) on oak frames placed on piles on the site of what is now Merrion Square, and it was claimed that one advantage of the site was that the garrison could be relieved by water. These plans are ascribed by some authorities to one, Sir Bernard de Gomme, a Royal Engineer, and at one time Engineer General to Prince Rupert at the siege of Bristol, but by others to the distinguished London Engineer, Andrew Yarranton, who also projected the forming in the Dodder Gulf of the great Harbour of Dublin.

It is to de Gomme we owe one of the earliest of the maps of the Port of Dublin. It is dated 1673 and shows the coast line on the South side to coincide with the present line of railway between Herbert Bridge and Westland Row, while on the North side it ran along what is now Middle Abbey Street, North of Lower Abbey Street, to a point midway in Talbot Street, thence to the front of Amiens Street Station, and then parallel to and about 100 feet North of the North Strand and Amiens Street.

Between the flats which formed the delta, the river channel meandered tortuously and finally ran between the sand banks known as the North and South Bulls, because of the roar of the surf beating on them.

In 1698 the river had become so shallow and the channel so uncertain that neither barques nor lighters of any burden could



### *Institution of Civil Engineers of Ireland—continued*

get up except at spring tide, much merchandise being unloaded at Ringsend and thence carted to Dublin, and nine years later was taken the first of the steps which not only reclaimed a great area of valuable land, now densely built on, but also enabled Dublin to be developed as a modern port, for in that year the conservancy of the Port was vested in the Corporation and remained their responsibility until the Ballast Board was formed in 1786. It is because of the long period during which the Corporation were the Port Authority and also because of its intrinsic interest that I have included an account of the Port's early development in my Address.

The first action of the Board was to direct Mr. Morland or Moland to draw a map of the channel of the river from Essex Bridge to the bar. Morland was at that time mathematical master at the Blue Coat School, but also acted as Surveyor and Accountant to the Corporation.

The next step taken by the Corporation was to straighten the channel to the sea. This was done at first by laying kishes filled with stones along both banks and backing them with sand and gravel. Later a piling frame from Holland drove oak piles on the South bank below Ringsend, and it is reported in July, 1717, that three hundred piles had been driven on the South side and two hundred and fifty-eight kishes laid on the North side during that year. When the engine was unable to work even at low tide, frames made of piles 22-feet long and 10-feet wide were floated out from Blackrock and when in place filled with stones.

In 1748 the embankment between Ringsend and the Pigeon House was replaced by a double line of rubble walls retaining a sand embankment, and later the section between the Poolbeg Lighthouse and the Pigeon House was commenced from the Eastern end.

It made slow progress and as the original timber work decayed the sand breached it and silted up the channel, causing much dissatisfaction, so that in 1786 the conservancy was transferred to the Ballast Board, who completed the great South Wall ten years later and built the Pigeon House Harbour. By 1819 the old rubble walls had been refaced with granite ashlar.

As far back as 1728 a plan was prepared by Captain John Perry for a new entrance to the Harbour of Dublin to avoid the bar. This was to be by a canal to be carried through the sands of the North Bull parallel with the North shore of Dublin Bay, through Sutton Creek, with its seaward entrance near Kilbarrack old Church, which was as far as the Bull Island then extended. The landward end of the canal was to be nearly opposite Ringsend.

About the year 1800 the Ballast Board revived a proposal made apparently in 1786 by Mr. William Chapman of Newcastle for the construction of an embankment roughly parallel to the present North Bull Wall, but with its seaward end near Vernon Avenue.

At that time the greatest depth of water over the bar at L.W.O.S.T. was 8 feet, but on a direct line seaward from the river entrance, it was 5 feet only. The works carried out by the Board had done nothing to improve the bar—they were not designed to that end—and it was even incorrectly alleged that they had silted it up. The object of the Board was to enclose a great tidal basin which would ebb and flow through the river entrance between the Poolbeg and the South end of the projected wall and thence over the bar, deepening both.

In subsequent years Sir Thomas Hyde Page, a Royal Engineer, Captain Corneille and Captain Blyth were consulted and the latter made a valuable survey, and finally in 1802 Mr. Rennie prepared a scheme.

The principal provisions were for the construction of (a) the North Bull Wall and (b) of an embankment across the South Bull from a point about midway between the Pigeon House and the Poolbeg Lighthouse to Blackrock. 1,300 acres were to be enclosed and the scour water was to find entry to the area through a large opening in the South Wall near Ringsend.

In spite, however, of the enormous capacity of the North and South reservoirs—no less than 36,000,000 tons of water at spring tides—Mr. Rennie had little hope that natural scour would deepen the bar and he, therefore, proposed that a ship canal be built either along the North side of the bay to Sutton, or on the South side to Dun Laoghaire or Sandycove. His estimate for the latter scheme was £489,734.

The estimated cost of Mr. Rennie's schemes held up any further work for some time, and it was not till about 1818 that Mr. Francis Giles prepared plans substantially on the line proposed by the Board in 1800, that is for a North Bull Wall with one opening 600 feet wide between the Bull Island and the Dollymount foreshore. It is interesting to note that he considered that if at a later date additional scour was required, this could be got by forming an embankment between the Bull Island and Sutton. The wall was commenced in 1820 and completed in 1827 at a cost of £95,000 sterling.

The wall effected a revolution in the condition at the entrance to the Port, and thus laid the foundations on which the modern Port has been built. By 1835 the depth of water at the bar had been increased by 5 feet and in 1878 was no less than 16 feet, though no dredging was done on it.

The strands between O'Connell Bridge and Ringsend on both sides, and the strands west of Merchants Quay outside the City walls, formed particularly valuable wharfage if the ground level could be raised above high water. There were two opposing views concerning the walling of the river east of Westmoreland Street. One view was that it was essential to preserve the large area of sloblands within the point of Ringsend to store flood water for scouring out the bar. The other view was that the walling in of the river was essential to progress. In the 18th century the demand for wharfage was great, and the strands were granted by the City to merchants. The names of these merchants are perpetuated in the names of the Quays. Ellis built Ellis' Quay; Usher, a great citizen in his time, built the Quay wall at Usher's Island; Hawkins built a quay wall where Hawkins Street now is; and Sir John Rogerson built the wall along Sir John Rogerson's Quay.

Rogerson's wall was built on the mud without foundation, as were all the Quay walls until George Semple, in 1753, first used a sheet piled coffer dam in Dublin for underwater works. Rogerson's wall is of some interest now as indicating the methods of construction at the beginning of the 18th century. It was 12-ft. 6-in. high to a finished level about 17.0 O.D., 4-ft. wide at the base and 1-ft. 6-in. wide at the top, vertical at the back, with a batter of 1 in 5 on the water side. Built with stones and lime mortar, it stood the best part of 100 years.

Shortly after Rogerson began the river Liffey wall, the Corporation began to wall in the lower reaches of the River Dodder and began to build the river wall along the City Quay. The immediate effect of building these walls was to de-water 300 acres between the new wall and the old coast line along the line from Hawkins Street to Pearse Street. It would appear that the original ground level on this reclaimed area was not very much below high tide level, as there is no record of any considerable quantity of filling having been carried out. The present level of this area is about 16.0 O.D., the ground at Bath Avenue being as low as 13.0 O.D. over this area. Such filling as has occurred came about by dumping rather than filling, and many basements within the area founded on the original sands and gravels.

The reclamation of the North side was of much later date, because it was not until 1715 that the Ballast Board, more with a view to the improvement of the channel than to the reclamation of adjoining land, laid down kishes to secure the North side of the channel. This work progressed to such an extent that in 1717 the Corporation anticipated the building of the North Wall and the reclamation of the area behind it, and in that year they proceeded to a lottery among themselves of this land. The obligation under these leases was to construct walls running at right angles to the wall along the channel which was completed in 1728, by which date, however, the sea still had access to the back of the wall, and it required the dredgings and the accumulated rubbish and filling of nearly 100 years of the river bottom to reclaim the area behind it.

The walling-in on the North side of the river channel and along East Wall Road de-watered 400 acres, and it is of some interest to note that the present level of the road surface at East Road is, in places, only 10.0 O.D. The reclamation of this area has caused some drainage problems as in wet weather, with a high tide, the ground becomes completely water-logged.



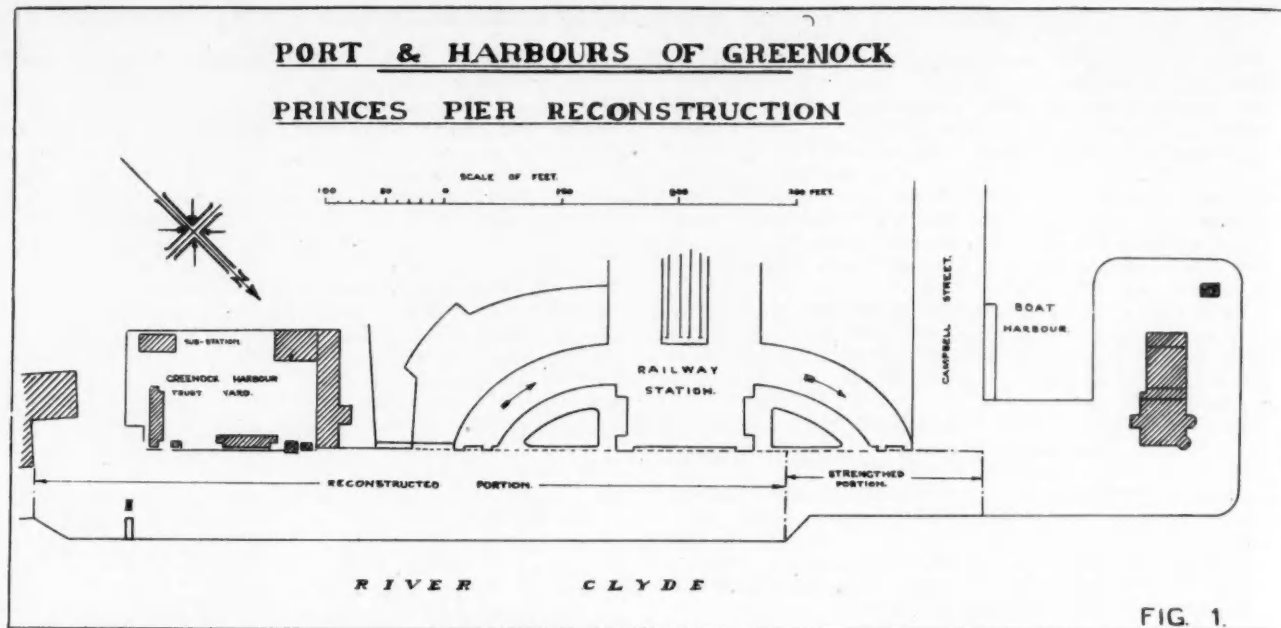


FIG. 1.

## Greenock Harbour Improvement

### Reconstruction of Princes Pier

On the outbreak of War, Princes Pier, Greenock, was in an advanced state of obsolescence. The old timber pier constructed seventy-five years ago had deteriorated to such an extent that it had become unfit for traffic.

#### The Former Pier

The old structure was anchored by means of tie rods to anchor piles with rubble deposited in front of them to increase their resistance. These piles being about 250 feet behind the old Wharf were all under the Station Buildings subsequently constructed on the site.

There was an ominous risk of collapse of the Pier. Had such collapse occurred, there was the further risk of the collapse of the closely adjacent Station Buildings and consequent serious interference with the Clyde Navigation Channel which passes close to the Pier.

#### Considerations for Design for New Pier

In addition to traffic requirements, the Pier had to retain a great depth of mud and very soft clay which formed the banks of the river in this location.

It being vital to the War effort to provide for the very important traffic to be dealt with on the Clyde Estuary, it was decided to place the major portion of the Pier with a heavier structure with deeper water alongside over the reconstructed length shown in Fig. 1.

Under the circumstances special precautions had to be taken to reduce to a minimum the risk of collapse during reconstruction and it was deemed advisable that the design of the new work should be such as would cause the least disturbance of the ground behind the Pier. For this, amongst other reasons, it was decided to adopt an independent anchorage clear of the Railway Station.

The reconstructed portion of the Pier having not only to carry the loads from land traffic and the stresses from shipping alongside, had also to resist the earth pressures resulting from the great depth of mud and soft clay which would be imposed particularly after the berths alongside had been dredged to the increased depth. Another factor bearing on the design was the importance of rapid construction.

For the foregoing reasons it was decided to adopt a steel piled structure with reinforced concrete superstructure, the anchorage being obtained by raker piles carrying a relieving platform to reduce the pressure on the sheeting induced by the fill and the pressure of the very soft material behind, all as indicated in Fig. 2.

The whole of the underwater portion of the Pier consists of very heavy steel piling, all of which was driven to the rock and founded at depths of from 65 to 90 feet below the road surface of the Pier.

The raker and vertical bearing piles are of box section and the sheet piling is, for the most part, of the heaviest section, reinforced with two and three piles of plates to increase their moment of resistance.

The reinforced concrete superstructure is carried on vertical bearing piles and consists of vertical frames at 12 feet centres with



#### PRINCES PIER RECONSTRUCTION, GREENOCK

Close-up of section of pier being concreted, and shuttering for R.C. frame bases. Note  $1\frac{1}{2}$  cu. yd. skip placing concrete for front capping beam over a length of 26-ft. Tide beaten by  $\frac{1}{4}$  hour. Also main pile frame driving No. 1 pile 16-ft. 6-in. from front of existing structure with piling engine cantilevered over seaward point of support. Piles 1, 2 and 3 shown have to be so driven that they are in true line on the line of the R.C. frames

**Greenock Harbour Improvement—continued**

walings and deck beams carrying a reinforced concrete deck behind which there is a reinforced concrete retaining wall.

Behind the retaining wall there is a reinforced concrete relieving platform supported on raker piles. The filling over the relieving platform is divided into compartments by means of diaphragm walls at 12 feet centres and this filling carries a reinforced concrete roadway.

**Difficulties of Reconstruction**

As can be readily appreciated from the physical features of the site, the work of reconstruction was carried out under considerable difficulties. Precautions had to be taken to safeguard the Station Buildings which were kept in constant use during the whole period of reconstruction. The fact that access between shipping and the Station had to be maintained, together with the operation of the very heavy piling plant used, all tended to make the work difficult.

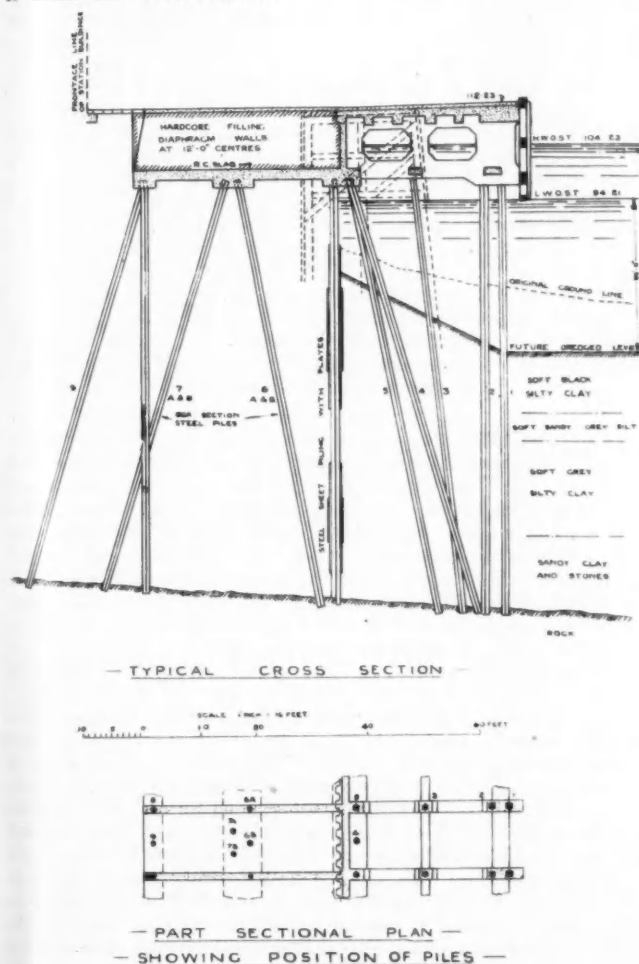


FIG. 2

**Princes Pier Reconstruction**

Under the circumstances, credit is due to all concerned that the work was carried out without any serious mishap and the Greenock Harbour Trust can be congratulated in now having a much improved Pier which will no doubt serve its very useful purpose and in addition remain a permanent and distinctive landmark on the Clyde for two or three generations as its predecessor did before it.

The consulting Engineer for the work was Mr. Arch. Henderson, M.Inst.C.E.; the General Manager and Engineer to the Greenock Harbour Trust is Mr. Donald Smith, M.Inst.C.E., and the Contractors were Messrs. George Wimpey & Co. Ltd.

**Tay Estuary Tidal Model****Outline of Experimental Investigation**

As previously reported, the Dundee Harbour Trust has sanctioned the expenditure of a sum up to £10,000 on the construction of a model of the tidal estuary of the River Tay, in order that an exact and scientific study may be made of the probable effects of certain river development and improvement works contemplated in the estuary.

In this connection, a lecture was recently given to the Dundee Institute of Engineers by Dr. J. Allen, senior lecturer in engineering at Manchester University, who, acting in concert with Professor A. H. Gibson, also of Manchester University, has been appointed to construct and supervise the operation of the model.

In his lecture, Dr. Allen said the Harbour Trust were hoping to carry out certain development works. Therefore the question arose as to whether those proposed works would have any effect on the tides, currents, sandbanks and channels in the Firth of Tay. That was a matter which could not be answered on purely theoretical grounds. The object of the model investigation was to determine the probable effect of these works by laboratory experiments. The model would be a scale reproduction of the Firth of Tay. The horizontal scale was three feet to the mile and the vertical scale one inch to twelve feet, with an overall length of approximately 125-ft. It was necessary that the model should cover the full length of the river, which was about 50-ft. wide at the mouth. The time scale would be about five minutes, corresponding with approximately 12½ hours of nature. If one operated the experiment for one hour, one would get six days of tides and for 60 hours a year of tides. There had been ample evidence on previous occasions that without model experiments taking place prior to major alterations in river contours, serious effects had been observed.

Dealing generally with models of tidal rivers, Dr. Allen said in our present state of knowledge we had to regard hydraulics or fluid mechanics in general as an experimental science. There was a considerable theoretical background, but the details had to be filled in by knowledge based on actual experiment. Well-known examples were the frictional resistance offered by pipes to the turbulent flow of a fluid; the co-efficient of discharge of weirs and orifices; the resistance of ships and aircraft. Perhaps the most difficult problems were found where the solid boundary was itself susceptible to movement, as was the case where the engineer was concerned with the régime of a river. It was now generally recognised that laboratory experiments on scale models could contribute materially to the solution of engineering problems in this field.

The first serious attempt to develop a technique of studying the behaviour of a tidal river by means of scale models was made by Professor Osborne Reynolds in Manchester some 60 years ago. Reynolds immediately realised that there was a direct connection between the time-scale and the geometrical scales of the model. The history of developments since the pioneering days of Osborne Reynolds was largely associated with the name of Dr. A. H. Gibson, a one-time professor in Dundee, an honorary graduate of St. Andrews, and present occupant of the chair of his former chief (Osborne Reynolds) in Manchester.

By means of illustrations, Dr. Allen described examples of specific tidal model investigations, including the laboratory studies of the Severn Barrage Scheme, the Liverpool Bay training walls, the entrance channels to the Port of Rangoon, the improvement of the Chester Dee, and the Bridgwater Parrett.

**South Wales Port Conference.**

With a view to getting more shipping to call at the South Wales ports, a conference has been held at Swansea at which the Parliamentary Secretaries of the Ministry of Labour and of the Ministry of War Transport had prolonged talks with Swansea Dock officials and representatives of the local Chamber of Commerce. The Conference was a sequel to the recent promise to the Chamber of Commerce by the Minister of War Transport that he would investigate the shipping position at the ports of South Wales.

## The Dock and Harbour Authorities' Association

### Executive Committee's Report\*

#### Meetings

The Executive Committee have met six times and Sub-Committees eight times during the year.

Thirty Circulars on various matters, including an Interim Report in June, have been issued to Members.

#### Members

The following eleven Authorities joined the Association during the year: City of Exeter, Teignmouth Quay Co., Ltd., Sutton Harbour Improvement Company, River Dee Navigation Board, Colchester Corporation, Borough of Wisbech, Weymouth Town Council, Royal Burgh of Kirkcaldy, Borough of Torquay, Bridlington Piers and Harbour, and the Falmouth Docks and Engineering Co.

#### Executive Committee

The Committee appointed **Colonel J. G. B. Beazley** (Mersey Docks and Harbour Board) as their Chairman for the fifth successive year.

Two vacancies occurred on the Committee during the year, which were filled (Rule 6 (6)) as follows:—

**Alderman A. W. S. Burgess** to represent the Bristol Channel District in the place of Mr. R. H. Jones, who resigned in September, on retiring from the position of General Manager, Port of Bristol Authority.

Mr. Jones had represented the Bristol Channel District since 1932, and the Committee wish to place on record their appreciation of his valued work.

**Mr. J. A. Alexander**, to represent Northern Ireland in the place of Mr. M. J. Watkins, whom he succeeded in the post of General Manager, Belfast Harbour Commission, on the death of Mr. Watkins in August.

Mr. Watkins had represented Northern Ireland on the Committee continuously since 1923, and the Committee deeply regret his death.

**Mr. Walter Sedgwick** (Messrs. Rees & Freres) has retired from the position of Parliamentary Solicitor to the Association, and the Executive Committee have appointed **Mr. L. J. H. Horner**, one of his partners, to take his place.

Mr. Sedgwick has acted as legal adviser to the Association from its inception, and the Committee, while recording their deep appreciation of his services, are happy to feel that he is still available for consultation and advice when necessary.

#### Sub-Committees

A list of Sub-Committees for 1945-46 is set out in last year's Report.

During the year **Mr. F. D. Arney**, General Manager, Port of Bristol Authority, took the place of Mr. R. H. Jones on the Parliamentary and General Matters, and the Dock and Factory Matters Sub-Committees, and **Mr. R. P. Biddle** (Southern Railway) took the place of Mr. H. A. Short on the Parliamentary and General Matters Sub-Committee.

**Mr. D. O. Dunlop** resigned from the Rating and Valuation Matters Sub-Committee on retiring from his position with the Manchester Ship Canal Company.

#### Bills in Parliament

The under-mentioned Public Bills were considered:—

SESSION 1944-45			Royal Assent
Emergency Powers Defence	...	...	June 15th
Distribution of Industry	...	...	June 15th
Expiring Laws Continuance	...	...	Dec. 21st
Export Guarantees	...	...	March 7th
Finance	...	...	June 15th
Income Tax	...	...	June 15th

\* Slightly abridged. Held over from last issue.

Local Authorities Loans	...	...	March 28th
Local Government (Boundary Commission)	...	...	March 28th
Requisitioned Land and War Works	...	...	June 15th
Water	...	...	June 15th

#### SESSION 1945-46

Civil Defence (Suspension of Powers)	...	...	Dec. 10th
Chartered and other Bodies (Resumption of Elections)	...	...	Dec. 10th
Statutory Orders (Special Procedure)	...	...	Dec. 20th
Supplies and Services (Transitional Powers)	...	...	Dec. 10th

#### BILLS PENDING

Acquisition of Land (Authorisation of Procedure).  
 Dock Workers (Regulation of Employment).  
 Emergency Laws (Transitional Provisions).  
 National Insurance (Industrial Injuries).  
 Police.  
 Trunk Roads.

#### Post-War Organisation—Docks and Harbours

The Report adopted by the Association at the Special General Meeting held in London on the 14th February was submitted to the Minister of War Transport on the 16th February.

At the request of the Minister the Report was forwarded to the bodies referred to in Part II, namely, the Chamber of Shipping, the Association of British Chambers of Commerce, the Association of Municipal Corporations, and the Scottish Convention of Royal Burghs, for their comments. Observations from these and other organisations to whom the Report was sent were referred in due course to the Minister.

The criticisms on the Report were, on the whole, not unfavourable, and mainly consisted in a desire for increased representation on the proposed Advisory Council.

Attention is called to the statement by the Lord President of the Council (Mr. Herbert Morrison) on the 19th November in the House of Commons detailing the Government's nationalisation proposals, which in relation to docks and harbours is as follows:—

THE LORD PRESIDENT OF THE COUNCIL (Mr. Herbert Morrison) "I desire, with your permission, Mr. Speaker, to make the following statement. His Majesty's Government believe that it is in the public interest that they should give a general indication of the further Measures they propose to introduce during the life of the present Parliament to bring certain essential services under public ownership. This statement, which follows the clear indication of Government policy contained in the King's Speech at the beginning of the Session, will enable the Ministers concerned to enter into consultation with the industries affected. . . .

"Dock and Harbour undertakings will be brought within the scope of the national scheme. The most suitable form of public ownership is under examination, as is also the question of including certain appropriate ancillary activities.

"It is not the intention of the Government to propose the nationalisation of the shipping industry, and we shall rely on the industry to have full regard to the public interest. The Government look with confidence to the shipping industry generally to play a full part in the effort towards national economic recovery, and are alive to the problems with which our shipping finds itself confronted as a result of the war."

As a result of a Question and Answer in the House of Commons on 26th November, 1945, the matter was further elucidated as follows:—

MR. SPEARMAN asked the Minister of War Transport in connection with the nationalisation proposals for transport, if it was intended that the assets of dock and harbour undertakings would be acquired by the State, or whether the existing ownerships were to be continued; and what were the appropriate ancillary activities he had in mind in connection with his proposals.

MR. BARNES said that in reply to the first part of the question he was unable at present to add anything to the statement recently made by Mr. H. Morrison. As to the



*Dock and Harbour Authorities' Association—continued*

second part, among the ancillary activities he had in mind as requiring examination were functions in regard to navigation and pilotage.

The Executive Committee considered these statements at a meeting in December, and decided that no action be taken at present, and no further submissions beyond those contained in the Association's Report on Post-War Organisation be made to the Government.

**War Damage**

The Government have not yet introduced the promised Bill which will deal with the subject of War Damage to Public Utility Undertakers.

A Memorandum was circulated in August (Circular 616) detailing the steps taken to ensure that the Government are fully apprised of the special position of the undertakings of Dock and Harbour Authorities.

The Executive Committee early in the year set up a Sub-Committee of Accountants who were charged with the investigation of the accounting problems involved in the preparation of claims for War Damage, particularly the question of the addition of sums to cover oncost in connection with repairs and reinstatement.

Members were informed (Cir. 601) of the recommendation of the Sub-Committee, which were as follows:—

(1) Amounts should be included for establishment charges in claims for war damage, whether the work of reinstating or repairing the damage is carried out by a contractor or departmentally;

(2) No attempt should be made to fix a uniform rate of percentage to cover oncosts, but each Authority should be left to negotiate a percentage addition with the department concerned.

The Ministry of War Transport in a letter dated 27th of September referred to the Government White Paper (Cmd. 6403), dated November, 1942 (circulated to Members with Cir. No. 557, dated November 16th, 1942), and asked the Association before the introduction of legislation to send representatives to discuss the composition of the Dock and Harbour Group, total amount to be payable in respect of war damage to the Group, and the proportions in which the cost should be borne by the members of the Group and the taxpayer respectively.

The Chairman of the Executive Committee, with the Parliamentary and General Matters Sub-Committee, met representatives of the Ministry on the 24th October, when it was decided that the Accountants' Sub-Committee, with the Ministry's Accountants, should be charged with the duty of ascertaining and recommending to the Minister and the members of the Group respectively the total amount of war damage sustained by the Group, together with the basis of the apportionment of the contributions to be borne by the members of the Group. The Accountants have held several meetings, and have been supplied with information from members, as a result of which they will soon be in a position to report the conclusion of negotiations with the Ministry for settling the basis upon which war damage is to be computed. They are also clearing up a number of ancillary matters such as the treatment of leasehold properties and the method of tabulating the claims to be rendered by each member of the Group.

**Removal and Dispersal of Wrecks—Mines**

The Association's case was circulated to Members on the 15th March (Cir. No. 600).

This memorandum drew attention to the problem of the removal of wrecks which are lying in or near the approaches to harbours, referred to the heavy cost of removal of these wrecks, and the unsatisfactory position under the Merchant Shipping Act, which left the Board of Trade, now, for this purpose, the Ministry of War Transport, to determine questions arising between a Harbour and Conservancy Authority on the one hand and a General Lighthouse Authority on the other hand, with the result that the words "In or near any approach

thereto" have been extended to cover wrecks lying much further out than Harbour Authorities anticipated would be the case under the Act. The memorandum pointed out further that after the war the Admiralty will cease to maintain swept channels, so that wrecks which up to that time were not a danger to navigation by reason of being outside the swept channel would become such a danger.

Finally, it was stressed that the marking of these wrecks and their removal or dispersal in the interests of navigation is an obligation which should be undertaken by the Government in the national interests as part of the damage to be borne by the whole nation.

It was felt that the question was so important that the Executive Committee asked the Minister of War Transport to receive a deputation, which the President consented to lead.

An exploratory meeting, with representatives of the Treasury and the Admiralty Wreck-raising and Dispersal Departments, was held on the 2nd October, with the object of clearing up points before a deputation was received.

At this meeting the Association's representatives were informed that a clause had been inserted in the draft War Damage Bill relating to Public Utility Undertakers, to the effect that the cost of raising wrecks both inside and outside the Ports was to be considered as war damage in so far as it was not recovered by the Port Authority concerned under its statutory powers.

At a further meeting on 24th October it was agreed that the proposed deputation be postponed pending the Ministry obtaining from the Admiralty full particulars of wrecks in or near the approaches to harbours for the information of the Minister.

A letter dated 10th December from the Ministry detailing the result of its consultation with the Admiralty is at present under consideration.

**Decasualisation of Dock Labour****Dock Workers (Regulation of Employment) Bill**

The protracted negotiations which have resulted in the recent agreement with the Trade Unions have, of course, been conducted by the National Association of Port Employers, who have from time to time kept the Executive Committee informed of the position.

The object of the Dock Workers (Regulation of Employment) Bill, which was introduced in October, and passed the House of Commons before Christmas, is to enable permanent schemes to be made for ensuring greater regularity of employment for dock workers, and securing that an adequate number of dock workers is available for the efficient performance of their work.

The Parliamentary and General Matters Sub-Committee considered the Bill, and raised a few points by letter with the Ministry of Labour and National Service in order to ascertain whether the wording of Clause 1 of the Bill was sufficiently wide to enable schemes on the lines of the scheme at present in operation in the North-West Ports to be brought into force and, secondly, to ascertain if the wording was wide enough to allow Dock Authorities to be made responsible for the administration of schemes, notwithstanding statutory limitations on their existing contributions.

An assurance was received with regard to the first point, and the Minister put down an amendment to cover the second point, which has been passed. An amendment by the Minister was accepted at the Report Stage putting forward the date as from which schemes can be applied by the Minister to Ports where no agreement has been reached.

**Trunk Roads Bill**

This Bill, which passed Standing Committee in the House of Commons (1st House) before Christmas, has for its main purpose to supplement the national system of routes (including roads within areas hitherto excluded from the trunk road system) forming an interconnecting system of principal routes between various parts of the country.

Clause 6 enables the Minister to make Orders, subject to certain safeguards, providing for the construction as part of the trunk road system of bridges or tunnels over or under navigable

### Dock and Harbour Authorities' Association—continued

waters, and by Clause 7 privately-owned and maintained bridges carrying trunk roads will be transferred to the Minister.

Amendments to Clauses 6 and 7 to safeguard the bridges of Navigation Authorities were tabled.

Representatives of the Association and of the Canal Association attended a conference at the Ministry of War Transport, and as a result of this meeting the amendments were withdrawn, and amendments tabled by the Government were put down to meet the points raised and subsequently passed.

It is considered that the bridges and other rights of navigation authorities are now satisfactorily protected under the Bill.

#### Requisitioned Land and War Works Bill

This Bill received the Royal Assent on 15th June. It dealt with the situation arising out of the use of land for the purposes of the war, and gave to the Crown a power of compulsory acquisition and easements in connection with requisitioned land on which valuable buildings had been erected or extensive work done, the expenditure incurred having been borne by the Exchequer or by a person having no interest or a limited interest in the land.

The Treasury were pressed by the Railway Companies' Association and this Association to insert a clause for the protection of the land statutory undertakings similar to the clause in the like Bill, Defence of the Realm (Acquisition of Land) Act, 1916, passed during the last war.

The Chancellor of the Exchequer would not agree to such an excluding clause, but put down an amendment to the Bill to save agreements.

The Chancellor's clause (now Section 51 of the Act) partly met the Association's point of view, but it did not affect the right of the Minister under Clause 7 of the Bill to acquire in connection with any land easements over any other land or his right to discharge or modify restrictions as to the user of the land which he has acquired.

The Association therefore took steps to have an amendment set down when the Bill was in Committee to prevent the Minister acquiring easements over land belonging to statutory undertakers.

The amendment was, however, withdrawn in view of a letter from the Treasury, which contained the following assurance:—

"The considerations you mention in relation to easements over Dock and Harbour estates are, of course, fully recognised, and there is no intention whatever to use Clause 7 in a manner detrimental to Dock undertakings. Indeed, it is hoped that any question that may arise will be easily settled by negotiation and in full agreement. In the case of dispute the Commission would no doubt pay special attention to any argument that the taking of an easement would be detrimental to the working of the undertaking concerned."

#### Income Tax Bill

This Bill received the Royal Assent on 15th June.

The object of the Bill was to give effect to the proposals for the changes in taxation of industry after the war, to which reference was made by the Chancellor of the Exchequer (then Sir John Anderson) in his Budget Speech in May, 1944.

Under Part I of the Bill there was made an initial allowance of 10 per cent. of the cost of new industrial buildings, and an annual allowance of 2 per cent. to write off the cost.

Under Clause 8 the expression "industrial building or structure" was construed as meaning, *inter alia*, a building or structure in use for the purpose of a transport, dock, water, electricity, or hydraulic power undertaking.

The Association's Parliamentary Sub-Committee felt it advisable to obtain an assurance that the interpretation intended to be placed on the above expression by the Treasury would be sufficiently wide to cover all works of construction forming part of a dock undertaking.

The Treasury were therefore asked whether the allowances referred to in Part I of the Bill are intended to apply to the main classes of works set out in the following extract from the Association's letter dated 19th March:—

"(1) *Docks*.—By virtue of Clause 11, is expenditure on the construction of the quays and quay walls of a wet dock confined to such quays and quay walls only, or are Dock Authorities entitled to claim an allowance for all expenditure incurred in the construction of the whole dock, including the excavation and dredging necessary to obtain that required depth?

"My Association assume that they are entitled to claim an allowance for the whole of the expenditure incurred in the construction of a dry dock in so far as it differs from a wet dock as the floor forms an essential part of the structure.

"(2) *Lock Entrances*.—It is assumed that the whole expenditure incurred in the construction of a lock entrance, including the construction of the floor, is entitled to the allowances.

"(3) *Pierheads, breakwaters for the protection of the entrance to a harbour, jetties, training walls, dolphins and mooring posts, other than piers or jetties primarily used for recreation.*

"(4) *Floating structures, such as landing stages for the embarkation of passengers, cattle and baggage.*

"(5) *Bridges.*

"(6) *Sluices, culverts, sewers and drains.*

"(7) *Roads and paved areas in dock undertakings.* The Association would like to have some guidance on whether the allowance is to apply to all roads and paved areas or is to be confined to structures such as tunnels and cuttings."

A satisfactory reply was received from the Inland Revenue Department dated 30th March, in the following terms:—

"I am directed by the Board of Inland Revenue to inform you that expenditure by a Dock Undertaking on the structures mentioned in your letter is regarded as qualifying for allowance under Part I of the Bill.

"The Board, however, desire to point out that in view of the provision of Clause 11 of the Bill, expenditure on excavation and dredging would not qualify, and that while roads and paved areas could be regarded as structures for the purposes of the Bill, any allowance in respect of expenditure on such structures could not extend to expenditure on preparatory cutting or tunnelling of land."

The Association's Accountants' Sub-Committee considered the Bill from a more technical angle, and raised a number of points with the Inland Revenue. The reply to these points was considered as generally satisfactory, and was communicated to Members with Circular No. 610 dated 16th July.

#### Water Bill

This Bill obtained the Royal Assent on 15th June.

The purpose of the Bill is to enable effect to be given in England and Wales to the policy set out in the Government White Paper (A National Water Policy, Cmd. 6515) of April, 1944.

Satisfactory amendments for the protection of navigation authorities, upon which this Association was consulted, were put forward on behalf of the Canal Association on Committee Stage, and accepted by the Government.

#### Water (Scotland) Bill

A similar Scottish Bill is at present before Parliament, and passed Standing Committee in the House of Commons (1st House) before Christmas.

#### Central Advisory Water Committee

When Clause 2 of the Water Bill referred to above was before Standing Committee the Minister of Health stated that the interests to be represented on the Central Advisory Water Committee to be constituted under the Act would include Docks and Harbours.

The Executive Committee therefore submitted the name of Mr. M. Kissane, Secretary of the Manchester Ship Canal Company, for appointment to the Committee.

*Dock and Harbour Authorities' Association—continued***National Insurance (Industrial Injuries) Bill**

This Bill passed Standing Committee in the House of Commons (1st House) before Christmas.

A letter was sent to the Ministry of War Transport with reference to Pilotage, since insurable employment under the Bill includes employment as a pilot on board any ship or vessel in any case where the person employed holds a licence or deep sea certificate from a Pilotage Authority covering that employment, and in any such other cases as may be prescribed.

The letter raised certain administrative difficulties which would be experienced under the Bill by Pilotage Authorities, and amendments were set down by the Parliamentary Chairman to Clauses 74 and 76 to meet these difficulties.

One point raised was met by an amendment set down by the Minister which will enable Regulations to be made to prescribe different persons as employers for different purposes of the Act.

**Arrangements with the Government, 1920****Government Traffic (Dock Charges) Committee**

A memorandum showing points raised on the Arrangement since 1920, with particular reference to decisions regarding its interpretation made by the Government Traffic (Dock Charges) Committee since 1940, was circulated (Cir. No. 611).

The Dock Charges Committee held one meeting during the year. At that meeting a Sub-Committee, consisting of a Treasury representative, a Dock and Harbour representative (Mr. T. Howarth, Port of London Authority), with the Chairman, was set up, so as to simplify procedure in cases where agreement could not be reached on the Committee. When in any particular case agreement could not be reached, or a principle was agreed but its application remained to be worked out, the case will be referred to the Sub-Committee for examination, after hearing, if necessary, representations of any Government Department or Dock Authority particularly concerned.

If the Sub-Committee agree as to their decision, this will be binding; otherwise, separate recommendations will be made to the Minister for decision.

The Sub-Committee have already considered a few cases arising out of paragraph 4 of the Arrangement, which paragraph, it will be remembered, deals with cases of set-off by Government Departments where, by the construction of works or otherwise, services are rendered to a Port Authority.

**Miscellaneous Matters**

Other matters which received attention during the year include the following:—

**Aids to Navigation:**

- (a) Allocation and use of Radio Frequencies.
- (b) Decca Navigator—Demonstration.
- (c) Radio Aids to Navigation—Interdepartmental Committee.

British Standards Institution—Specifications.

Catering Wages Commission—Industrial and Staff Canteen Wages Board.

Damage to Dock Roads by War Department Vehicles (Cir. No. 602).

Docks and Harbours—Protected Places.

Dock Police—Anti-Pilferage.

Dues on Ships calling for Repairs.

Dues on Vessels with net Registered Tonnage of nil.

Factories Act, 1937—Revision of Building Regulations.

Harbour Bye-laws—Various Questions.

Institute of Transport—Dock and Harbour Awards (Cir. No. 625).

Loading of Ships (Ship Warrant Scheme) Order, 1945 (S.R. & O. 967).

Mooring and Unmooring of Vessels—Practice.

Paper—Supply of for Port Publications.

Pilotage—Led Vessels.

Publication of Accounts—Public Utility (Prevention of Publications) Order 1944 (Circs. Nos. 595 and 608).

Rates and Charges—Procedure for obtaining Increase.

Shipping Regulations.

Thomas Gray Memorial Trust—Awards (Cir. No. 612).

Yachting and Boating Facilities.

**Accounts.**

The expenditure charged to the year's Accounts amounts to £3,542 13s. 4d. and £3,807 12s. 6d. was subscribed by Members.

The excess of income over expenditure for the year amounted to £279 2s. 0d., which, added to the surplus for 1944 (£5 10s. 9d.), makes a total surplus at 31st December, 1945, of £284 12s. 9d.

The Executive Committee propose to submit a Resolution to the Annual Meeting that the surplus, notwithstanding the provisions of Rule 15 (5) of the Association's Constitution and Rules, be carried forward to the current year's Accounts.

The Report is signed by Sir Frederick J. West (Chairman) and Mr. W. Ashley Cummins (Secretary).

**Polish Port Reconstruction**

In an interview published in the Swedish Press, the Polish Minister Eugeniusz Kwiatkowski, discusses the future of the Polish ports.

The Minister stated that naturally the capacity of the ports of Danzig and Gdynia had been very much lowered, so that ships had to reckon with a certain period of waiting, although he hoped that conditions would improve before long. The Minister also revealed some of the large-scale plans for the reconstruction of the ports. In the coming four years it was intended to restore all harbours along the coast, whereas it would probably take somewhat longer with the towns. Thus as far as Danzig was concerned a reconstructional programme covering ten years has been drawn up. Destruction in that town amounted to about 50 per cent.

In planning the reconstruction of the ports, in which a sum of about 300 million dollars would be involved, regard had of course been paid to the change in conditions now after the war. While thus, for instance, Poland exported large quantities of timber from the eastern districts which are now Russian, the country now depends upon considerable imports instead.

In the Minister's opinion the ports of Danzig and Gdynia would remain the most important Polish ports. He himself had taken part in the founding of the port of Gdynia in 1924, and he mentioned with some pride that his most optimistic dreams had been far exceeded, as before the war the port handled not less than 10 million tons annually as against 7 million tons in Danzig. Now, of course, the figures were lower, although they were moving in the right direction. All storehouses and warehouses in the harbour were unfit for use, but then there was 32,000 sq. metres available plus 10,000 sq. metres in Danzig.

**Belfast Port Trade**

The report for 1945, presented at the recent annual meeting of the Belfast Harbour Board, shows that in 1945 the net register tonnage of vessels cleared was 134,793 tons less than the record total of 4,669,516 in 1944. The tonnage of goods imported and exported amounted to 3,965,750, a decrease of 169,529. The gross revenue for the year was £479,440 and the total expenditure £453,911, a net surplus of £25,529.

The harbour engineer's report indicates that numerous works of improvement have been effected during the year. These included the dredging of 364,500 tons, 63,000 tons being raised from the Musgrave Channel in preparation for the launch of H.M.S. *Eagle*. The spoil was discharged over the Co. Down reclamation area, where the Tillys Burn has been diverted in connection with the proposed extension of the N.E.-S.W. runway from 1,100 to 2,000 yards at the airport. The extension of the banks bounding the proposed new area has totalled 2,120-ft.



### Book Reviews

**Sheet Piling, Cofferdams and Caissons.** By Donovan Lee, M.Inst.C.E., pp. 191, published by Concrete Publications, Ltd. Price 10s. net.

The object of this book is not only to treat theoretically and practically the subjects indicated by the title, but to explain why in any particular case a certain design or constructional procedure is adopted. The book deals with reinforced concrete, timber, and steel sheet piling, the active and passive pressures to which sheet-piled walls are subjected, the design and construction of cofferdams, and of bridge and other foundations of the cylinder and caisson types. Open and compressed-air designs of caisson are considered, together with box-caissons used as breakwaters, as in the Mulberry Harbour. The treatment of cofferdams includes valuable particulars relating to timbering and to pumping. Different types of sheet-piled walls, anchored or otherwise, are described. The text is illustrated and amplified by photographs, working drawings, design curves, and tables; there is a pictorial representation of most of the matters under discussion.

**Materials Handling Manual (Vol. II),** pp. 488, price 30/-, published by Paul Elek (Publishers), Ltd. This second volume provides an up-to-date survey of the whole field of Materials Handling Equipment. Reference has been made, as far as space and paper permit, to the important papers in the Proceedings of the Institutions of Civil Engineers and Mechanical Engineers, and to articles in the weekly and monthly journals which bear on the subjects headings of this volume. A number of articles have been specially contributed.

After the special articles in Part I, the book is divided into the following main sections:—

(I) Continuous Bulk Movement, mainly horizontal, as with belt conveyors and their accessories, other types of bulk conveyor, portable conveyors and loaders and overhead bulk conveying as by aerial ropeway.

(II) Continuous Bulk Movement, mainly vertical, as with bulk elevators and pneumatic handling.

(III) Package Handling by continuous movement, horizontal and vertical.

(IV) Intermittent Movement, as earth moving, drag scrapers, cranes, hoists and trucks.

The book is profusely illustrated with photographs of machinery and auxiliary equipment, with folder sheets and various sketches.

### Publications Received

**Mitchell Wagon Tippers** is the title of an illustrated brochure issued by Mitchell Engineering, Ltd., 1, Bedford Square, London, W.C.1, dealing with all varieties of tipping appliances manufactured by the firm for use in the handling of coal and minerals. The illustrations are of installations in various parts of the country and abroad. Copies are available post free on request to IEDA Publications Dept., Stanground, Peterborough.

The 28th Annual Number of the **Shipping Register and Shipbuilder**, issued by H. R. Pickens, Jnr., Publisher, of Montreal, under the editorship of J. Alex. Morton, is a large, readable size review of shipping and shipbuilding affairs in Canada. It is profusely illustrated, largely with photographs of "The Men Behind our Ships" and contains an informative series of articles on Canadian Harbours and Waterways. There is a message from the Hon. Douglas C. Abbott, Canadian Minister of National Defence, and the Editorial contains an article in support of the St. Lawrence Seaway scheme. "Opposition to this great project," it says, "must eventually be broken down," and it quotes the late President Roosevelt as saying: "It is inevitable, the sooner the better."

**Build the Ships.** A brochure of 66 pages extensively illustrated by photographic views of shipyards and shipyard personnel, issued by the Ministry of Information with the approval of the Admiralty, and published at the price of one shilling by H.M. Stationery Office. Written in popular style, it gives an effective

picture of the work of British shipbuilding establishments and shows how all ranks of the workers in the industry, from the highest to the lowest, played their essential parts in building up and maintaining the numerous units of the British Fleet during the hazardous period of hostilities. Apart from the text, which provides an excellent commentary, written by V. S. Pritchett, the photographs themselves constitute a remarkably complete pictorial record of shipbuilding operations from the laying down of the keel of a vessel to its successful launching. They also show the processes involved in repairing ships which have been damaged by enemy attack, and their restoration to a state of efficiency. A most informative and interesting presentation of what may be termed the pre-eminent national industry of Great Britain.

**Standard Methods of Analysis of Iron, Steel and Ferro-Alloys,** as used in the Laboratories of the United Steel Companies, Sheffield, 10, by whom the volume is published. Pp. 93. Price 7s. 6d. The third edition, revised and enlarged, of a well-known work of reference, brought up-to-date, so as to cover the progress made in chemical methods of analysis during the past few years, with revision of older methods. There are two subdivisions: Part I deals with the analysis of Irons and Steels and Part II with the analysis of Ferro-Alloys. The volume includes a table of International Atomic Weights, 1941.

The 3rd edition of the booklet entitled "**Loud Hailer**" contains an illustrated record of the many and varied uses to which the apparatus, effectively described by its name, has been put during the war years, in connection with military and naval operations. Particulars will be sent on application to the Ardenne Acoustic Laboratories, Ltd., Guildford, Surrey.

The December issue of **The Transport Situation in Europe**, compiled by the European Central Inland Transport Organisation (40, Grosvenor Square, London, W.1), contains much useful and interesting information, including a certain amount on waterways and ports, indicating the progress which has been made in their rehabilitation after the war period. The price is 5s. net.

**Civil Engineering as a Career.**—A pamphlet which, it is anticipated, will be of considerable assistance to young men who intend to become Civil Engineers, as well as to parents, guardians and school masters responsible for advising on the choice of a career, has been published under the above title by the Institution of Civil Engineers.

The pamphlet traces briefly the history of civil engineering, including the foundation of the Institution of Civil Engineers, and deals at length with the general education and the scientific and practical training desirable for those who intend to enter the profession. A liberal education with no particular specialisation in the early stages is advocated and emphasis is laid on the desirability, if possible, of intending engineers taking full-time university or technical college courses leading to a degree recognised as exempting in part from the Institution examinations. Full particulars are given of the examinations conducted by the Institution for those who are unable to take such courses, as well as the practical training which a young man must undergo before becoming eligible for admission to the ranks of the Institution.

Young men who aspire to become engineers are urged to complete their theoretical qualifications as early as possible, and at the outset of their careers to seek opportunity for acquiring wide knowledge and experience rather than immediate financial advantage. The pamphlet contains chapters dealing with the various branches of civil engineering, e.g., railway, municipal engineering, harbour and docks, water supply and drainage, consulting engineering, etc., with their particular requirements and activities, and the prospects they offer.

**RANGOON PORT COMMISSIONERS REQUIRE MASTER** for Bucket Dredger, five-year contract with probable renewal, carrying superannuation and leave. Probable salary about rupees 800 monthly. Box No. 77, The Dock & Harbour Authority, 19, Harcourt Street, W.I.

**KING'S LYNN DOCKS AND RAILWAY COMPANY.** OFFICE MANAGER required. For the right man with knowledge of transport work and experience of the handling of labour. A salary of £800 p.a., inclusive of allowances, will be paid. Application by letter only, with copies of testimonials, to Dock Manager, King's Lynn, Norfolk.

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